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MODERN GERMAN HOSPITAL CONSTRUCTION

BY

WILLIAM MILBURN, JUN., A.R.I.B.A.,
HENRY SAXON SNELL PRIZEMAN 1908, GODWIN BURSAR 1910

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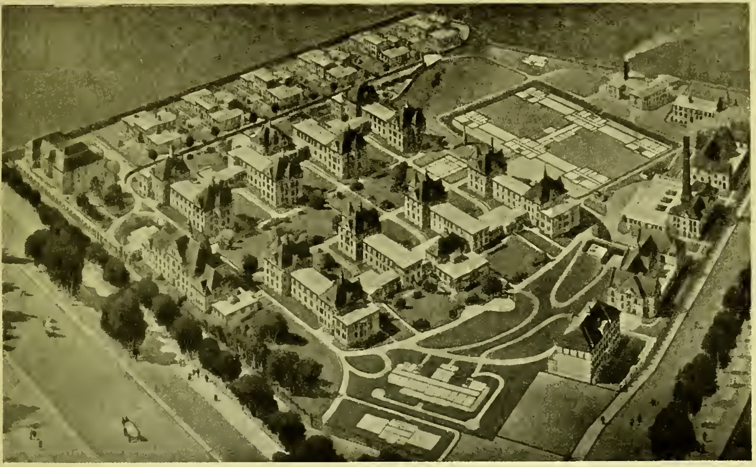

Fig. 6.—Perspective View of the West End Hospital, Charlottenburg (*see page* 39).

MODERN GERMAN HOSPITAL CONSTRUCTION.

By William Milburn, Junr., B.Sc. [*A.*], Henry Saxon Snell Prizeman 1908, Godwin Bursar 1910.

THE study, thought, and attention given to the design, construction, and equipment of hospitals, the large increase in the numbers of these institutions during the last thirty to forty years, and the developments which have taken place during that time in the treatment of the sick, render a study of modern German hospital construction of the utmost interest.

In Germany the general hospitals are erected, equipped, and maintained by the municipalities, each city possessing one or more hospitals according to the population. The system in vogue of compulsory insurance against sickness has had considerable influence on the development of the present hospital system. The institutions are open to all classes of the community, the fees varying from 2*s*. 6*d*. to 15*s*. or 20*s*. per day according to the accommodation.

The University hospitals or "Royal Clinics" are supported by the State and are the centres for medical education and study. The special hospitals correspond to the majority of our charitable institutions for the treatment of the sick, they being endowed or supported by some charitable organisation or religious body, such as the Jewish Hospital at Cologne or the Bürgerspital, Frankfort.

The private clinic or polyclinic, numbers of which are found in every city, is an essentially German institution, founded on club practice, the members being treated as out-patients by the medical officer attached to each clinic. The private hospitals are really nursing homes for the treatment of in-patients.

During recent years very great attention has been paid to post-graduate study and research, and at present regular courses are given in no less than forty-six cities, while an interesting result of the movement is the establishment of Academies for Practical Medicine in non-University towns, such as Düsseldorf and Cologne.

SITE.

In the selection of sites for the hospitals the greatest care is exercised so as to obtain ample space, pure air, light, and freedom from noise and dirt, the situations being usually on the outskirts of the cities or adjoining large open spaces. The relation of the site to the prevailing winds, the factory and smoke-producing quarters of the city, the ground water level, the height above adjoining rivers, and the subsoil, are all matters which receive the greatest attention. Whenever possible, land which has not previously been built upon is selected, and if practicable streets are arranged on all sides. The electric tramway service invariably connects all parts of the city with the hospital.

The area of the site per bed varies considerably, at Hamburg Eppendorf it being 130 square yards, at Nuremberg 123 square yards, at Dresden 86 square yards, at Hamburg St. Georg 72.7 square yards, at the Virchow, Berlin, 153 square yards, and at Charlottenburg 131 square yards.

The sites for the University hospitals and polyclinics are naturally more often in the centre or near the centre of the cities than on the outskirts.

ACCOMMODATION AND STAFF.

In comparison with the accommodation of the average English hospital, that of the German institutions is very large, as for example Hamburg Eppendorf and the Virchow, Berlin, each with 2,000 beds and a correspondingly large staff. It has been found, however, that when such a large number of patients are massed together the difficulties of administration are greatly increased, and the most recent view seems to be that 1,500 beds should be the maximum for one hospital.

In the majority of towns one general hospital is sufficient to meet the requirements; the larger, however, have more, Munich having three, Dresden two, Hamburg three, and Berlin four.

Generally speaking, every general hospital provides accommodation for all classes of cases, which are separated into departments for medical, surgical, infectious, maternity, gynæcological, children's, skin and venereal, etc., diseases, the buildings for each of these classes being specially designed and equipped to meet the requirements of each particular disease.

The administration of the hospitals is usually under the control of a superintendent director (Verwaltungs-Direktor), while two medical directors have charge of the medical and surgical departments respectively. All doctors are paid for their services, and the larger number reside in the hospital. The nursing staff corresponds to the English, usually consisting of a matron (Oberschwester), head nurses (Schwestern), and nurses or probationers (Pflegerinnen), while in some hospitals the nursing is in the hands of a religious sisterhood. A large proportion of the domestic and technical staffs reside in the hospital.

GENERAL ARRANGEMENT OF THE BUILDINGS ON THE SITE.

Owing to the varying requirements of the municipalities, considerable differences are found in the lay-out of the general hospitals, and a great variety of plans are found; but nevertheless, in a survey of the block plans of the principal hospitals erected during the last thirty or forty years, one can trace a definite development, largely owing to the fact that each new hospital is based on a careful study of contemporary designs and on all that have preceded it.

The modern era of German hospital construction may be said to date from the erection of the Moabit Hospital, Berlin, 1872, which, guided by the lessons derived from the Franco-German and the American Civil Wars, is designed on the pure pavilion system, in which each block is entirely separate and detached from the rest. Here [fig. 1] the administrative block is placed adjoining the main entrance, and the domestic and technical blocks are grouped close to it, while the plan is laid out about a central axis with the pavilions of the medical department to one side and those of the surgical to the other, all the pavilions being of one story. Further developments may be traced in the lay-out of the second great Berlin hospital at Friedrichshain, 1874, where two-story pavilions were employed and a modification in the block plan was introduced, owing to the adoption of the north and south axis for the pavilions as against the east and west at Moabit, and in the next Berlin hospital, Am Urban, 1883-90, where a simple symmetrical plan was obtained.

The Eppendorf Hospital, Hamburg, perhaps the most celebrated hospital in the world, opened in 1889, is designed in the pure pavilion style and has been so well kept up to date by additions and improvements that it holds its own with many of the more modern institutions. The hospital is situated in Eppendorf in the north of the city, its distance from the central point, the Rathaus, being, as the crow flies, 2⅕ miles. The total area of the land purchased by the municipality was about 136 acres, of which the hospital proper occupies about 46 acres, while the maternity, epidemic, and ophthalmic departments occupy another portion, and the remainder to the front of the hospital is laid out as a public park. The total accommodation is 2,150 beds, while the staff numbers 820, of whom some 670 reside in the hospital.

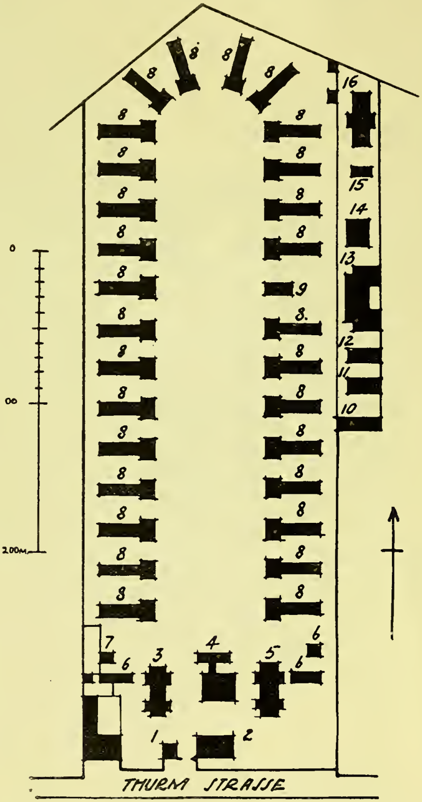

FIG. 1.—BLOCK PLAN OF THE MOABIT HOSPITAL, BERLIN.
1, Entrance Lodge. 2, Administrative Block. 3, Kitchen Block. 5, Laundry Block. 8, Pavilions. 13, Boiler House. 16, Mortuary Block.

As will be seen from the block plan [fig. 2], the institution consists of over 100 separate buildings, of which some 85 are for the reception of the sick, symmetrically placed upon the site about a central axis, which separates it into two sides, that for men to the east, for women to the west.

The administrative block, through which all patients must pass, is situated at the southern end of the axis, and the pavilions, the majority of which are of one story, are arranged in parallel rows with streets and gardens between them, their long axes running from north-west to south-east. The first two rows form the surgical department, the next three the medical department, the next the tuberculosis department, while the remaining seven blocks, which were erected in 1905-7, form the infectious diseases department. In the centre of the surgical department is the operation-house, in the centre of the medical the bath-house, and in the centre of the tuberculosis the Röntgen Institute. The domestic blocks, comprising the kitchen and laundry blocks, boiler-house, and disinfection block, are grouped together beyond a street

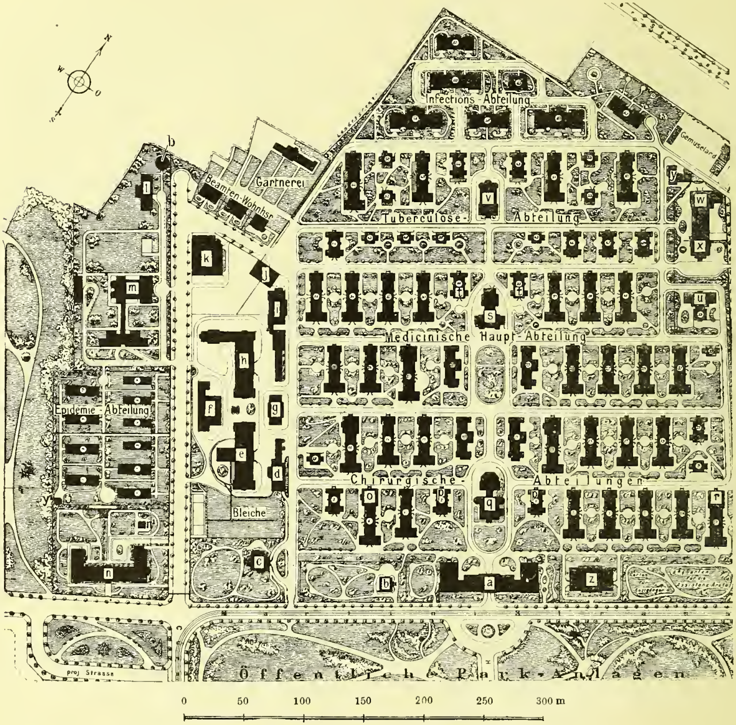

Fig. 2.—Block Plan of the Eppendorf Hospital, Hamburg.

(Chirurgische-Abteilungen = Surgical Department. Medizinische Haupt-Abteilung = Medical Department. Tuberculose-Abteilung = Tuberculosis Department. Infections-Abteilung = Infectious Diseases Department. Epidemie-Abteilung = Epidemic Department.)

a Administrative Block. **b** Administrative Director's Home. **c** Medical Director's Home. **d** Disinfection Block. **e** Laundry Block. **f** Boiler House. **g** Economy Block. **h** Kitchen Block. **i** Nurses' Home. **j** Ice House. **k** New Boiler House. **l** Maternity Department Isolation Block. **m** Maternity Department. **n** Ophthalmic Department. **o** Children's Pavilion. **p** Receiving Pavilion of the Surgical Department. **q** Operation House. **r** Children's Pavilion. **s** Bath House. **t** Receiving Pavilion of the Medical Department. **u** Delirium Tremens Pavilion. **v** Clinical Lecture Theatre and Röntgen Institute. **w** Pathological Institute. **x** Mortuary Chapel Block. **y** Drainage Disinfection Block. **z** Curative Gymnastics Block.

to the west of the women's side, while still further beyond are the pavilions of the ophthalmic, epidemic, and maternity departments.

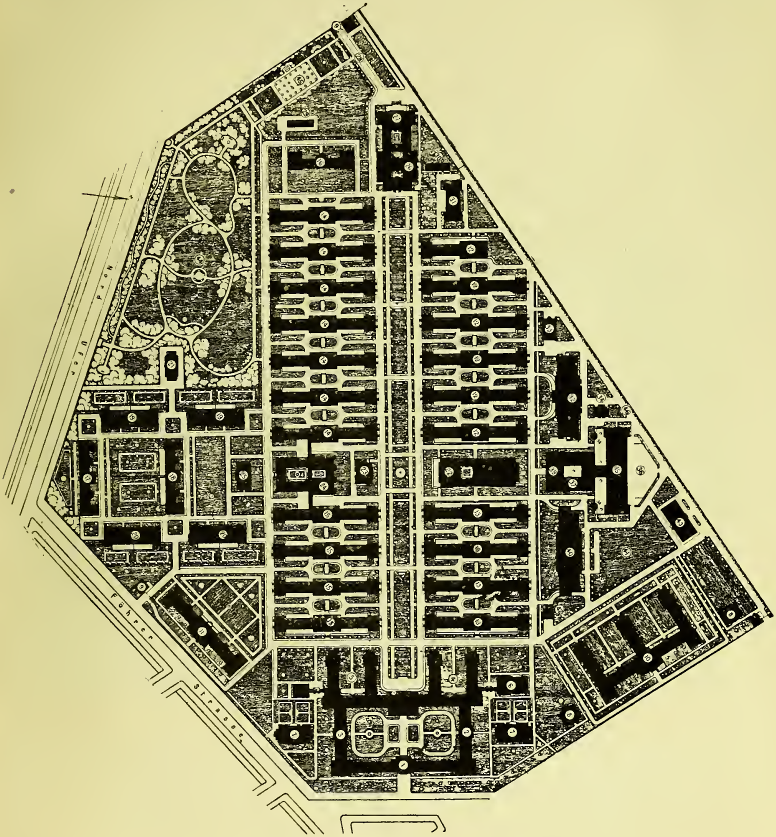

Fig. 3.—Block Plan of the Virchow Hospital, Berlin.

Administrative Block. 2, Medical Officers' Home. 3, Nurses' Home. 4, Gynæcological Department. 5, Maternity Department. 6, Medical Officers' Casino. 7, Directors' Houses. 8, Officials' Houses. 9, Lodges. 10, Skin and Venereal Diseases Department (Men). 11, Skin and Venereal Diseases Department (Women). 12, Medical Department (Men). 13, Medical Department (Women). 14, Surgical Department (Men). 15, Surgical Department (Women). 16, Violent Patients' Pavilion. 17–21, Infectious Diseases Department. 22, Bath House. 23, Dispensary. 24, Operation House. 25, Röntgen House. 26, Pathologic-Anatomical Institute. 27, Mortuary Chapel. 30, Animal House. 31, Disinfection Block. 32, Kitchen Block. 35–39, Boiler and Engine House Block. 40, Laundry Block. 43, Workshops.

Other fine hospitals erected on the pure pavilion system are the Johannstadt Hospital, Dresden, 1901, the reconstruction and reorganisation of the St. Georg Hospital, Hamburg, 1899-1910, and the General Hospital, Nuremberg, 1897.

The latest hospital erected in the pure pavilion style is the Virchow Hospital, Berlin, opened in 1906, which is said to be in many respects the finest hospital in the world. This is the fourth municipal hospital for Berlin, it being situated on a site, formerly an artillery parade-ground, some 63½ acres in extent, in the northern quarter of the city close to a large wood. The total accommodation is 2,000 beds, and the staff numbers some 700, who reside in the hospital.

The buildings [fig. 3] are symmetrically placed about two axes, the principal from east to west, the transverse from south to north. Controlling the main entrance to the hospital is the administrative block, which with the doctors' and nurses' homes and the maternity and gynæcological departments is planned round a courtyard. The principal axis then traverses the central avenue some 500 yards long and 40 yards wide, at the western extremity of which is the mortuary and pathological block with separate access to the adjoining street. To the south of the central avenue are the pavilions of the surgical department [fig. 4], to the north those of the medical department. The transverse axis divides the hospital into two sides, to the east for women, to the west for men. At the southern extremity of this axis is the infectious diseases department with separate access from the Föhrer Strasse. In the centre of the surgical department is the operation-house, and in the centre of the medical the bath-house, while at the northern extremity of the axis are the domestic and technical blocks comprising the kitchen and laundry, boiler and engine-house, etc., with separate road for external traffic. Separate blocks are provided for men and women for skin and venereal diseases, and a separate pavilion for violent patients. There is no system of classes of patients in this hospital. The institution is remarkable for the lay-out of its grounds, some two-thirds of which consist of parks and gardens planted with trees and flowers.

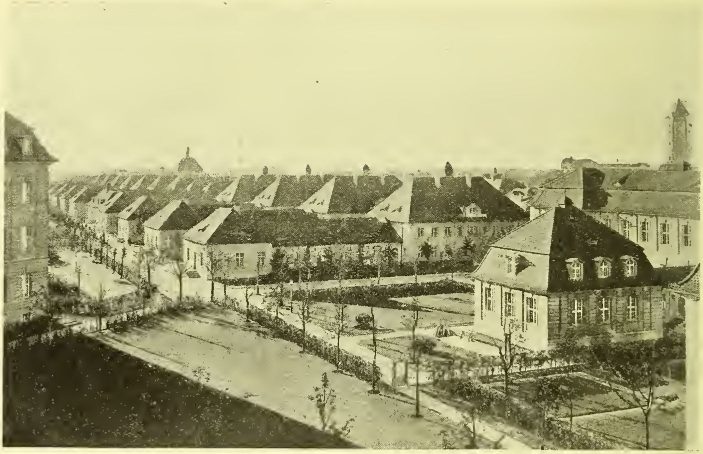

FIG. 4.—THE SURGICAL DEPARTMENT, THE VIRCHOW HOSPITAL, BERLIN.

There are, however, great disadvantages in the pavilion system proper, for it can well be imagined that in wet and stormy weather the difficulties of transporting the patients from the pavilions to and from the operation-house, the conduct of the various services, and the conveyance of the food from the kitchen block, become very great, and considerable inconvenience is caused to the staff and patients thereby. The majority of the recent examples either show or have the tendency to adopt the combined corridor and pavilion system, in which the separate blocks are linked up to one another by closed corridors.

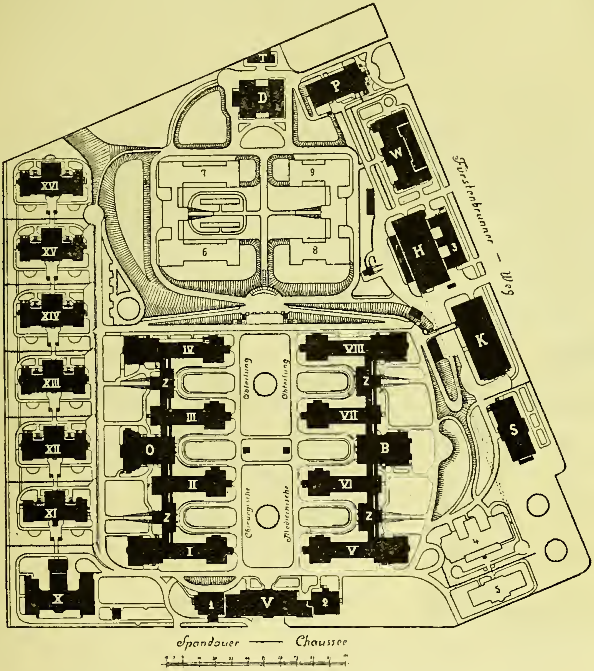

Fig. 5.—Block Plan of the West End Hospital, Charlottenburg.

V. Administrative Block.—1, Receiving Department; 2, Dispensary. I–IV. Surgical Pavilions. V–VIII. Medical Pavilions. X. Gynæcological Pavilion. XI–XVI. Isolation Pavilions.

O, Operation House. B, Bath House. Z, Receiving Blocks. P, Pathologic-Anatomical Block. T, Block for Experimental Animals. D, Disinfection Block. S, Nurses' Home. K, Kitchen Block. H, Boiler House Block. 3, Staff Homes. W, Laundry Block. 4, Future Private Patients' Pavilion. 6, 7, 8, 9, Future Pavilions. 5, Future Block for Gymnastic Exercises.

This is well seen in the block plan [fig. 5] of the West End Hospital, Charlottenburg, opened in 1904. Here the administrative block controls the main entrance, and the pavilions of the medical and surgical departments are symmetrically placed to the rear on either side of a large open space. The pavilions are of two stories, and it will be seen [fig. 6, p. 33] that those of the surgical department are linked up to one another and the operation-house in the centre by a closed corridor, as are those of the medical department to the bath-house. The pavilions of the infectious diseases department are one-story detached blocks to one side of the site, while at the other side adjoining the street and at a lower level are the domestic and technical blocks; the food service to the pavilions on the higher level being conducted from the first floor of the kitchen block over a bridge.

Cologne Lindenburg, 1908 [fig. 7], shows a still further development in that the two parallel connecting corridors are carried through to the administrative block, linking up the latter to the pavilions of the medical and surgical departments and the operation and bath houses. This hospital is one of the most interesting modern German institutions, the greatest care having been expended in its planning, construction, and equipment. The building originally on the site was a lunatic asylum, which with new buildings added in 1897 and 1900 was transformed into a general hospital. In 1905, a much larger site to the east having been acquired, the new hospital, with which is incorporated the Academy of Medicine, was erected, and the older buildings reconstructed, which accounts for the asymmetrical arrangement of the domestic and technical blocks and the pavilions of the infectious diseases department. The total accommodation is 1,108 beds.

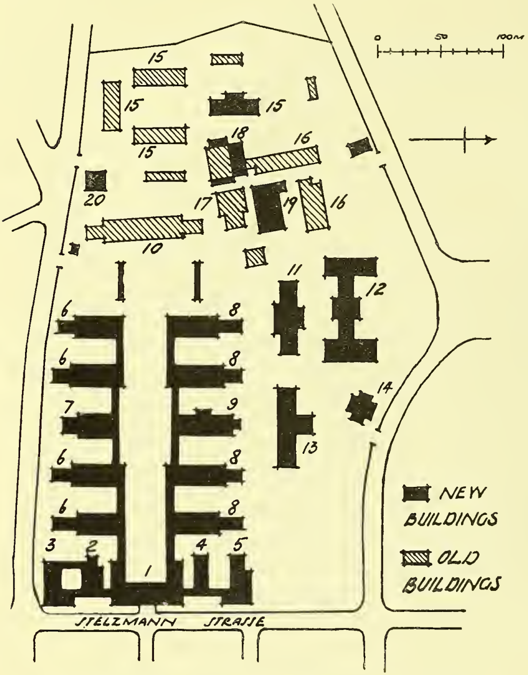

Fig. 7.—Block Plan of the Lindenburg Hospital, Cologne.

1, Administrative Block. 2, Chapel. 3, Nurses' Home. 4, Hall. 5, Private Patients' Pavilion. 6, Medical Pavilions. 7, Bath House. 8, Surgical Pavilions. 9, Operation House. 10, Tuberculosis Pavilion. 11, Pathologic-Anatomical Block. 12, Psychiatrical Clinic. 13, Children's Clinic. 14, Mortuary Chapel. 15, Infectious Diseases Pavilions. 16, Skin and Venereal Diseases Pavilions. 17, Kitchen Block. 18, Laundry Block. 19, Boiler House Block. 20, Disinfection Block.

Finally we come to the Third Hospital, Munich, 1908 [fig. 8], which is from every point of view of the greatest interest. The site is about 45 acres in extent and is situated in the northern portion of the city, being practically surrounded by open country on all sides. Owing to the high level of Munich and the sudden changes of temperature to which it is subject, it was thought inadvisable to erect a large number of detached one-story pavilions holding from 30 to 40 patients each, as in the older type of hospital, and better to erect large blocks of three stories, each holding some 150 patients, and connect the whole of the pavilions of the medical and surgical departments, the operation and bath houses, the administrative block, and the kitchen block by closed one-story corridors.

The administrative blocks and nurses' home face the Cölner Platz, two parallel corridors with an interspace of some 60 yards branching off to the north. Disconnected from these by cut-off corridors are, to either side, the six large pavilions. The vertical axis of the plan in this case separates the hospital into men's and women's sides, not as at the Virchow, Charlottenburg, or Cologne Lindenburg, the transverse axis; so that the operation-house and the bath-house are placed on the central axis between the first and second pairs of pavilions respectively, and are approached from either side, while the kitchen block is placed between the third pair of pavilions. Three courts are thus formed between these buildings, but as the operation-house, bath-house, and kitchen block are principally of one story, the access of light and air is not interfered with. The boiler-house and laundry, the disinfection-house, and the pathological institute are detached blocks to the rear of the site; while in the eastern portion of the land, with separate access, detached blocks for skin and venereal diseases, infectious diseases, and isolation are provided, and separate pavilions for gynæcological cases, children, and mental diseases will be erected. This hospital when complete will accommodate some 1,300 patients, the portion now erected containing about 500 beds.

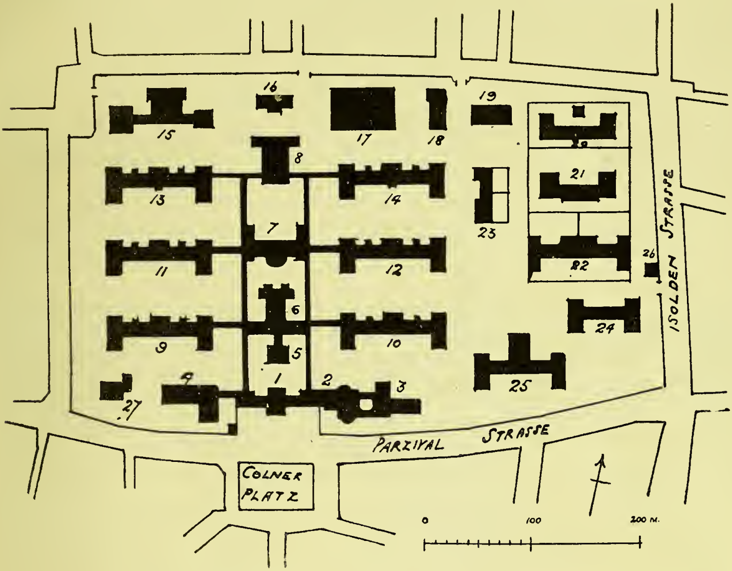

Fig. 8.—Block Plan of the Third Hospital, Munich.

1, Administrative Block. 2, Chapel. 3, Nurses' Home. 4, Offices and Dispensary. 5, Ambulatorium (Out-patients). 6, Operation House. 7, Bath House. 8, Kitchen Block. 9, 10, Surgical Pavilions. 11, 12, 13, 14, Medical Pavilions. 15, Laundry and Disinfection Block. 16, Greenhouse. 17, Boiler and Engine House. 18, Workshops Block. 19, Pathological Institute. 20, Isolation Block. 21, Infectious Diseases Pavilion. 22, Skin and Venereal Diseases Pavilion. 23, Mental Diseases Pavilion. 24, Children's Pavilion. 25, Gynæcological Pavilion. 26, Lodge. 27, Director.

The new hospitals at Rixdorf and Mülhausen-i.-Els all show connecting corridors linking up their pavilions.

Such hospitals as the Royal Charité, Berlin, the City Hospital, Frankfort, or the General Hospital, Düsseldorf, with which is incorporated the Academy of Medicine, in which the blocks are all detached, are, as it were, a series of special hospitals, each under the control of its own professor and staff, with common administrative, admission, domestic, and technical blocks. In these hospitals the operating theatres are in the blocks containing the surgical department, and at Düsseldorf patients are conveyed to and from the bath-house in a subway.

The smaller hospitals and clinics, with an accommodation up to about 200 beds, are usually erected on the block system, with the patients', administrative, and domestic rooms in one block, and the technical rooms, boiler-house, and the mortuary in another block or blocks. Excellent examples of this type of plan are the Bürgerspital at Frankfort, the Jewish Hospital at Cologne, or the Royal Ophthalmic and the Royal Psychiatrical Clinics at Munich.

ADMINISTRATIVE BLOCKS.

The administrative blocks of the German hospitals usually form the principal frontage of the institutions, and are designed in a most practical manner. The great point, perhaps, which one notices is that the main entrance to the hospital is for patients, their entrance, as so often in England, not being to one side.

In hospitals erected in the pure pavilion style one finds the administrative block of a definite type, as at Eppendorf, Dresden Johannstadt, or Nuremberg [fig. 9]. In the centre of the ground floor is a large carriage-hall [fig. 10], often elaborately treated, through which the patients are conveyed in the ambulance-wagons to the doors of their respective pavilions, and which is also used on visiting days for the assembly of patients' friends. The main entrance is always under the control of the porter. In one wing of the ground floor is the receiving and admission department (in which there is always a doctor on duty for the reception of accidents, and in which all patients are examined and the admission formalities complied with), and the various administrative offices, such as the directors', clerks', and treasurers' offices, and the waiting and messengers' rooms. In the other wing is the dispensing department, comprising the dispensary, laboratories, drug-stores, and dispensers' apartments. On the first floor is the doctors' home, comprising recreation- and bed-rooms, and the meeting-room for the administrative body, while on the roof floor are the servants' rooms, and in the basement the porters' and male servants' apartments, and stores. The chapel is sometimes in the administrative block as at Nuremberg or Schöneberg (first floor), or it is sometimes detached as at Eppendorf or Düsseldorf.

There are, however, certain objections to this type of plan, notably a patient with an infectious disease may be introduced into the centre of the administrative block, and the reception of accidents is often a distressing sight. These objections are overcome at Charlottenburg West End, by placing the receiving and admission department in a one-story wing at one end of the block, with separate entrance, and balancing this at the opposite end by a similar wing containing the dispensing department.

At the Virchow Hospital, Berlin [figs. 11 and 12], the administrative block is planned round a courtyard. In the centre of the front, which is of one story, is the main entrance to the hospital through a carriage-hall, with to one side the offices, and to the other the receiving and admission department. Patients are completely examined here, except the serious cases, which are only quickly examined in the ambulance-wagon and then sent to their respective pavilions. The north side of the courtyard is formed by the three-story doctors' home, the south side by the nurses' home, and the remaining side by a three-story block, which with outshoots contains the maternity and gynæcological departments. In the centre of this block is a carriage-way to the hospital proper, and the principal staircase to the upper floor to the large assembly-hall and nurses' class-room. This plan enables a very fine architectural treat-

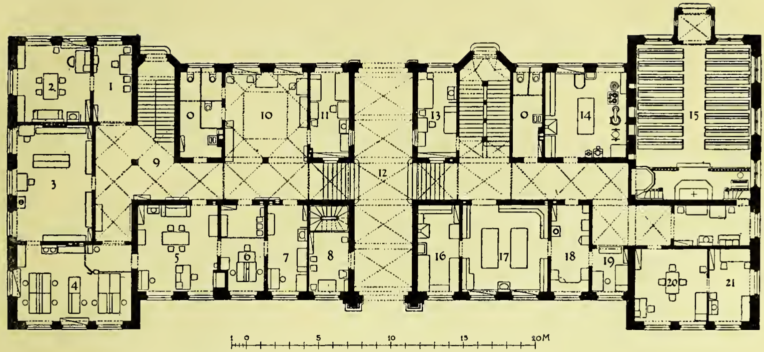

FIG. 9.—GROUND FLOOR PLAN OF THE ADMINISTRATIVE BLOCK, NUREMBERG.

1, 2, Medical Director. 3, 4, Administrative Offices. 5, Administrative Director. 6, Receiving Room. 7, Examination Room. 8, Porter. 10, Patients' Waiting Room. 11, Night Porter. 12, Carriage Hall. 14, 16, 17, 18, 19, Dispensary and Laboratories. 13, 20, 21 Dispensers' Apartments. 15, Chapel and Vestry.

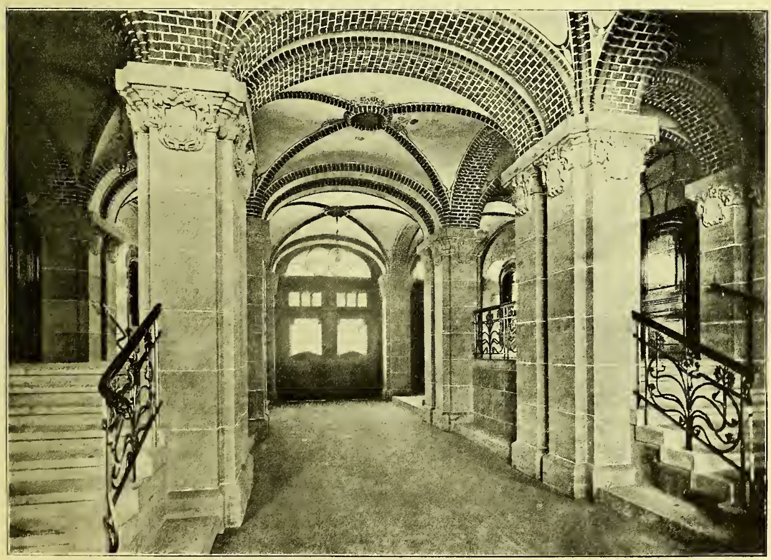

FIG. 10.—THE ENTRANCE HALL IN THE ADMINISTRATIVE BLOCK, DRESDEN JOHANNSTADT HOSPITAL.

ment to be given to the courtyard, but the planning of the maternity and gynæcological departments appears to have been somewhat influenced to suit this purpose. The doctors' recreation-rooms are contained in a detached block to the north, which is balanced by a similar block to the south, originally intended to contain the septic cases of the maternity department.

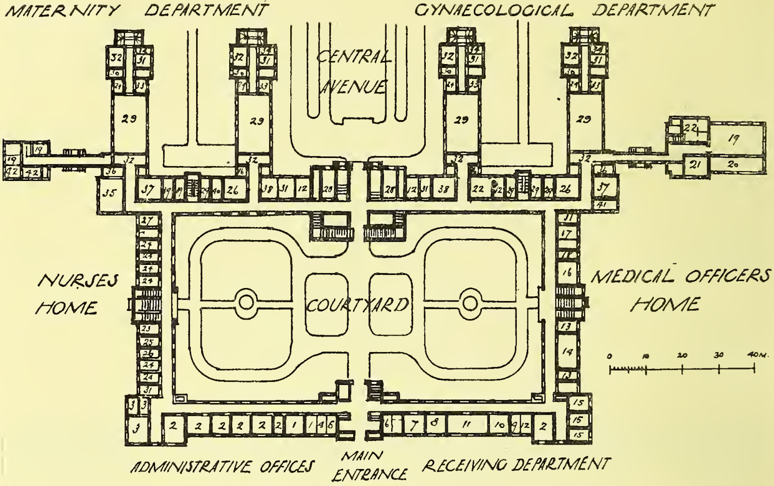

FIG. 11.—GROUND FLOOR PLAN OF THE ADMINISTRATIVE BLOCK, THE VIRCHOW HOSPITAL, BERLIN.

1, Administrative Director. 2, Office. 3, Treasurer. 4, Telephone Exchange. 5, Messenger. 6, Porter. 7, Men's Registration. 8, Men's Examination. 9, Women's Registration. 10, Women's Examination. 11, Waiting Room. 12, Attendant. 13, Director. 14, Committee Room. 15, Medical Officer. 16, Library. 17, Scientific Library. 18, Reading Room. 19, Dining Room. 20, Loggia. 21, Card Room. 22, Scullery. 23, Nurses' Examination. 24, Nurse. 25, Visitors. 26, Linen. 27, Dirty Linen. 28, Receiving Room. 29, Ward. 30, Lavatory. 31, Bath Room. 32, Day Room. 33, Apparatus. 34, Cleaner. 35, Labour Room. 36, Instruments. 37, Examination. 38, Doctors' Duty Room. 39, Head Nurse. 40, Nurse. 41, Anæsthetising Room. 42, Laboratory.

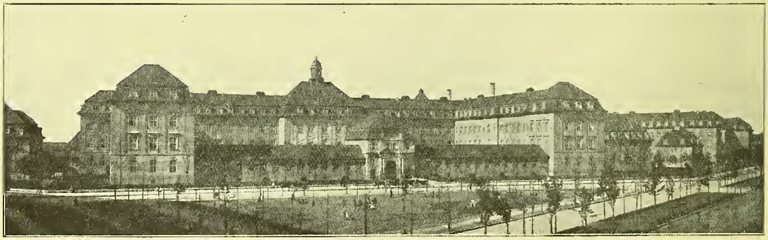

FIG. 12.—GENERAL VIEW OF THE ADMINISTRATIVE BLOCK, THE VIRCHOW HOSPITAL, BERLIN.

From the English point of view the most interesting administrative blocks are those of Cologne and Munich, as both these hospitals are planned on the corridor pavilion system. At

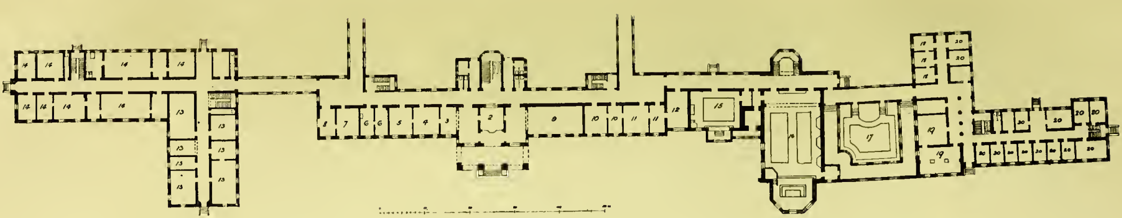

Fig. 13.—Ground Floor Plan of the Administrative Block, the Third Hospital, Munich.

1, Main Entrance. 2, Porter. 3, Patients' Waiting Room. 4, Registration Room. 5, Examination Room. 6, Matron. 7, Telephone Exchange. 8, Ambulance Entrance. 9, Waiting Room for Patients' Friends. 10, Head Medical Officer. 11, Director. 12, Committee Room. 13, Administrative and Accountants' Offices. 14, Dispensing Department. 15, Protestant Chapel. 16, Catholic Church. 17, Cloisters. 18, Home Sister. 19, Linen. 20, Nurses' Bedroom.

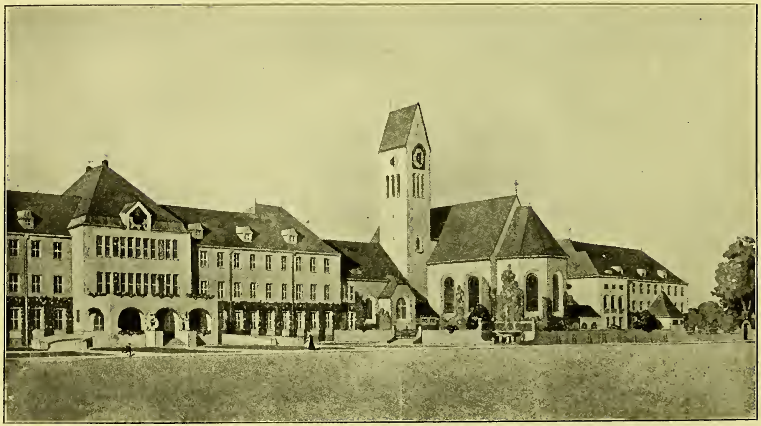

Fig. 14.—General View of the Administrative Block, the Third Hospital, Munich.

Cologne the central block is of three stories providing the usual accommodation, with a central carriage-hall through which the ambulance-wagons can convey the patients to the door of each pavilion. A central corridor runs from north to south, to the south being the chapel and the nurses' home, so planned as to form a cloister between the two, as the nursing here is in the hands of a religious sisterhood. To the north, symmetrically planned, is the assembly-hall, and the three-story pavilion for the accommodation of private patients of the first and second classes.

At Munich III. the principal façade is again formed by the administrative and adjoining blocks [figs. 13 and 14]. In the centre of the main block is the carriage-porch, with porters', admission and examination rooms, and waiting-rooms for patients' friends on visiting days. The side entrance is for the reception of accident or acute cases in the ambulance-wagons. In this hospital the ambulance-wagon does not convey patients directly to the pavilions, they being conducted through the corridors by the attendant. On the upper floors are the doctors' and staff apartments. In a block to the east, and so separated from the receiving department, are the accountants' offices and the dispensary. To the west is the chapel, the Catholic church, and the nurses' home with cloister, the nursing here being again in the hands of a religious sisterhood, accommodation for 115 sisters being provided, while the remaining attendants and the domestic staff reside partly in the pavilions and partly in the kitchen and laundry blocks.

MEDICAL AND SURGICAL DEPARTMENTS.

In the medical and surgical departments similar developments can be traced in the design of the pavilions, from the Moabit type to the latest at Munich III., as have been traced in the development of the block plans.

At the Moabit Hospital, Berlin [fig. 15], the pavilions consist simply of a large ward for 30 beds, with, at the entrance end, opening from a central corridor, a nurses' room, ward kitchen, linen-room, bath-room, and water-closets. This type was further developed at Friedrichshain, Am Urban Berlin, Hamburg Eppendorf, and Nuremberg.

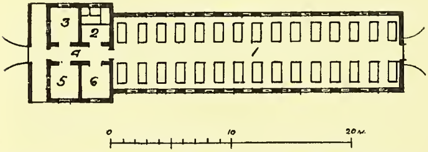

Fig. 15.—Ground Floor Plan of Pavilion, the Moabit Hospital, Berlin.

1, Ward for thirty beds. 2, Bath and Water-closets. 3, Linen. 4, Corridor. 5, Nurse. 6, Ward Kitchen.

Fig. 16 shows one of the one-story pavilions at Nuremberg for medical or surgical cases. The long axis runs from north to south. The patients are brought in the ambulance-wagon to the entrance, adjoining which are the small wards and the nurses' rooms. These rooms are disconnected from the large ward by a cross-corridor, which contains a slop sink, linen and clothes cupboard, telephone, and alarm-bell indicator. The large ward contains 32 beds ranged on either side, there being in addition to the usual ward furnishings two fixed double marble lavatory basins for the doctors', nurses', and patients' use. At the opposite end of the large ward is the day-room, from which double doors lead to the grounds by a ramp down to facilitate the food-wagon service to the ward kitchen, which adjoins the day-room, as it is here that the convalescent patients take their meals. The sanitary rooms are also situated at this end and comprise the bath-room and the cross-ventilated water-closet-room, which contains four water-closets and a slop-sink. In the basement is a store-room, and the rooms for the heating and ventilating apparatus.

This type of plan for a detached pavilion has now been largely superseded by the type introduced by Lenharz and Ruppel at Hamburg St. Georg in 1899, of which the Virchow pavilion is a development. Instead of providing one large ward for 32 beds, two wards each for about half that number are provided, the staff and service-rooms are placed in the centre, and the small wards and sanitary-rooms at each end.

The Virchow pavilions are all similar in design and are of one story with a two-story central block. The long axis runs from north to south and the length of the pavilion is 301 feet.

Fig. 17 shows a complete plan of the ground floor of one pavilion with all equipment. Patients enter at the centre through a small room, which contains the registration-desk, into the receiving-room, where they are undressed, examined, bathed, and dressed in hospital clothing, their own clothing being conveyed to the central clothes-store where it is kept until their discharge. Adjoining this room is an operation-room for minor operations and surgical dressings. The other rooms in the central block comprise the doctors' room for testing and laboratory work, the linen-store, the ward kitchen to which the food is brought to the service entrance and handed in through the hatch, the nurses' duty-room, dirty-linen disinfection-room, day-room, and staff lavatory. The large wards [fig. 18], which each contain 20 beds, are disconnected from the central block by cross-corridors, which give access to the terraces. It will be noted that by means of the through and cross-corridors the whole or any portion of the pavilion can be thoroughly ventilated. In the end blocks are two-bed and single-bed wards, the lavatory with three basins, bath-room with two baths, douche spray, and two sitz-baths, two water-closets, and the sink-room.

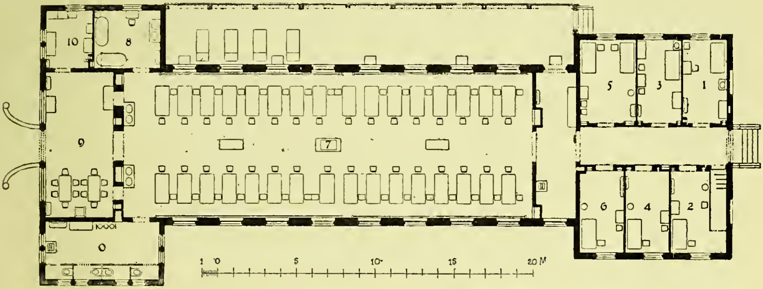

FIG. 16.—GROUND FLOOR PLAN OF PAVILION, NUREMBERG GENERAL HOSPITAL.

1, 4, 6, Single-Bed Wards. 5, Two-Bed Ward. 2, 3, Nurses' Rooms. 7, Ward for thirty-two beds. 8, Bath Room. 9, Day Room. 10, Ward Kitchen. 0, Water-closets and Sink Room.

On the first and roof floors of the central block are the apartments for the staff of each pavilion, medical, nursing, and domestic, and in the basement the heating and ventilating-rooms.

In spite of the care which has been exercised in the planning of these pavilions their design has been much criticised, particularly with regard to their great length, the number of small rooms, the distance of the small wards from the service-rooms, the curved form of the ceiling in the large wards and the smallness of the windows.

Of greatest interest from the English point of view are those hospitals in which the pavilions are united by connecting corridors.

Fig. 19 shows the two pavilions for men in the surgical department at the West End

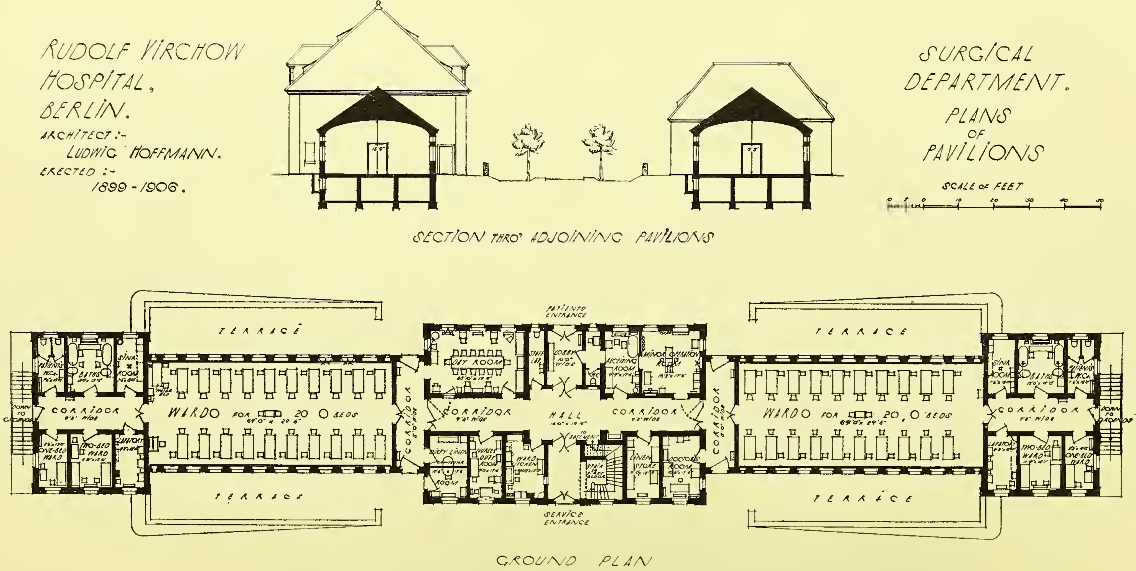

Fig. 17.—Ground Floor Plan of Surgical Pavilion, the Virchow Hospital, Berlin.

Hospital, Charlottenburg. The one-story block between the pavilions contains the receiving-rooms, to which all patients are brought, the laboratories for the two pavilions, and the day-room for the smaller pavilion. All patients are here examined, bathed, dressed in hospital clothing, and then conveyed to their ward.

The pavilions are of two stories of wards, with an upper floor to the front containing the apartments for the doctors and male attendants, and a similar floor to the rear containing the apartments for the nursing staff of each pavilion. The various series of rooms on each ward-floor are separated one from another by cross-ventilated corridors. To the front, adjoining the main entrance and staircase, are the staff and service rooms, comprising the doctors' and nurses' duty-room, linen-store, ward kitchen, to the window of which the food is brought, and scullery; in the centre is the large ward for 22 beds, with the bath-room and lavatory adjoining; to the rear are two three-bedded wards, a single-bed ward, and bandaging and sterilising-rooms; while the rooms common to both sets of wards are placed between them, and comprise a large day-room, the water-closets, and sink and disinfecting-rooms, with provision in the latter for sterilising the fæces before discharge into the drains, and for disinfecting the dirty linen before its conveyance to the laundry.

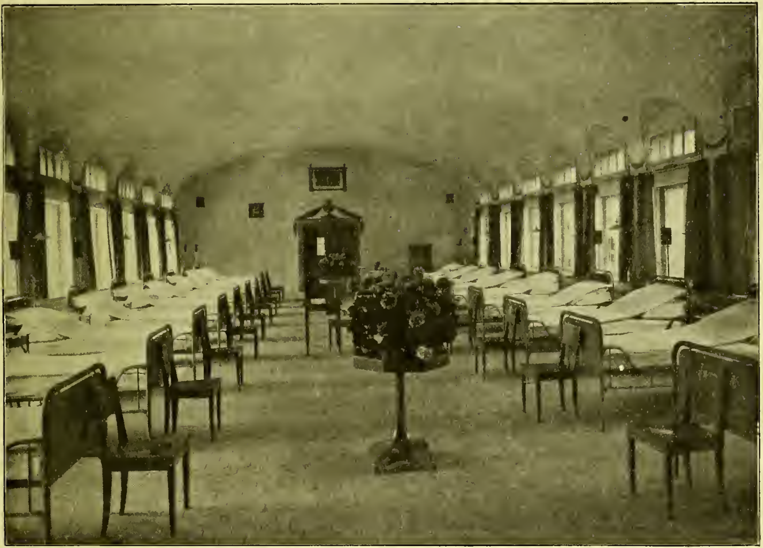

Fig. 18.—Ward for Twenty Beds, the Virchow Hospital, Berlin.

The smaller pavilion is similar in detail to the larger, except that the large ward contains 16 beds only, while some of the rooms are rearranged owing to the omission of the rear block so as not to interfere with the lighting and ventilation of the operation-house.

At Cologne Lindenburg [fig. 20] the corridor type of pavilion is approached, the large ward, which in five of the pavilions contains 14 beds and in the remaining three 20 beds, only taking up a small proportion of the total length. The pavilions are of two stories of wards, with the doctors' apartments and clothes-stores on the second floor. At the entrance, adjoining the main staircase and bed-lift, is the receiving bath-room, in which all new patients are bathed before admission to the wards. This receiving bath-room only occurs on the ground floor, its place being taken on the first floor by a small isolation department for two beds. The small wards are for one, two, and six beds respectively, between them and the large ward being the doctors' room for bandaging in the surgical department and for laboratory work in the medical, linen-store, day-room, nurses' and attendants' rooms, bath-room, and water-closets, and the ward kitchen, the food being brought to the latter from outside. It will be seen that the central corridor is well lighted and ventilated from open verandahs on both sides. The large ward contains in a recess four lavatory basins for the patients' use and at the entrance end a basin for the use of the doctor.

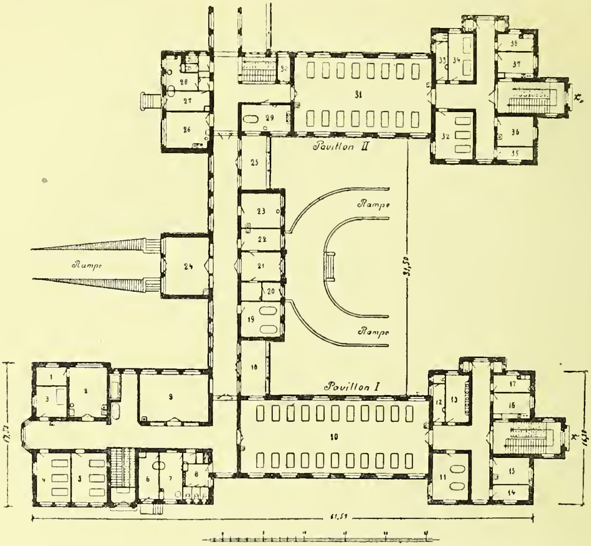

Fig. 19.—Ground Floor Plan of Pavilions I. and II. of the Surgical Department, Charlottenburg West End Hospital.

Pavilion I.—1, Sterilising Room. 2, Minor Operations. 3, Single-Bed Ward. 4, 5, Three-Bed Wards. 6, 7, Disinfecting and Sink Room. 8, Patients' Water-closets. 9, Day Room. 10, Ward for twenty-two beds. 11, Bath Room. 12, Cleaner and Staff Water-closet. 13, Patients' Lavatory. 14, Linen. 15, Duty Room. 16, Ward Kitchen. 17, Scullery.

Receiving Block.—19, Receiving Bath Room. 20, Undressing Room. 21, Entrance and Waiting Room. 22, Nurse. 23, Laboratory for Pavilions I. and II. 24, Day Room for Pavilion II. 18, 25, Verandahs.

Pavilion II.—26, Minor Operations. 27, 28, Disinfecting and Sink Room. 29, Bath and Lavatory. 30, Sterilising Room. 31, Ward for sixteen beds. 32, Three-Bed Ward. 33, Cleaner and Staff Water-closet. 34, Two-Bed Ward. 35, Linen. 36, Duty Room. 37, Ward Kitchen. 38, Scullery.

At Munich III. [fig. 21] the design of the pavilions of the medical and surgical departments is of the greatest interest, the corridor type of plan being fully developed. Each pavilion is of three stories of wards and is disconnected from the main corridor by a cut-off corridor some 100 feet long. All patients' rooms face due south and open from a corridor 10 feet wide. At the entrance to each pavilion is a receiving department comprising undressing, bath, and dressing rooms, through which all new patients pass. The wards on each floor comprise two for twelve beds, one for six beds, two for four beds, two for three beds, three for two beds, and one single bed, each pavilion thus containing some 150 patients. The remaining rooms comprise a central day-room, ward kitchen and scullery, head-doctors' room, store-room, attendants' room with two beds, bath-rooms, and lavatories. In the central block to the north is a bandaging-room, a laboratory, dirty-linen room, nurses', staff and patients' water-closets, and in the blocks at either end a ward for permanent baths, sink-rooms with fæces disinfectors, patients' water-closets, and a store-room.

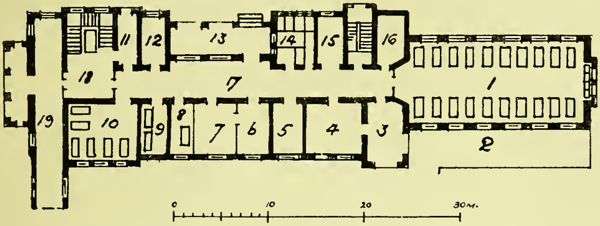

FIG. 20.—GROUND FLOOR PLAN OF SURGICAL PAVILION, THE LINDENBURG HOSPITAL, COLOGNE.

1, Ward for twenty beds. 2, Terrace. 3, 13, Verandah. 4, Day Room. 5, Bath Room. 6, Linen. 7, Bandaging Room. 8. One-Bed Ward. 9, Two-Bed Ward. 10, Six-Bed Ward. 11, Receiving Bathroom. 12, 16, Nurses' Room. 14, Water-closets and Sink Room. 15, Ward Kitchen. 17, Corridor. 18, Staircase. 19, Main Corridor.

Thus a remarkable development has been traced from the one-story Moabit pavilion 1872 of the pure pavilion type with one large ward for 30 beds and four small adjoining rooms, to the latest three-story pavilion at Munich III. of the corridor pavilion type, where the number of rooms is greatly increased, and the wards contain a maximum number of twelve beds, the majority containing six beds and under. It is considered possible that this reduction in the number of beds per ward will continue until in the next fifteen years or so the maximum number per ward will be ten beds or thereabouts, as it permits of a thorough classification of

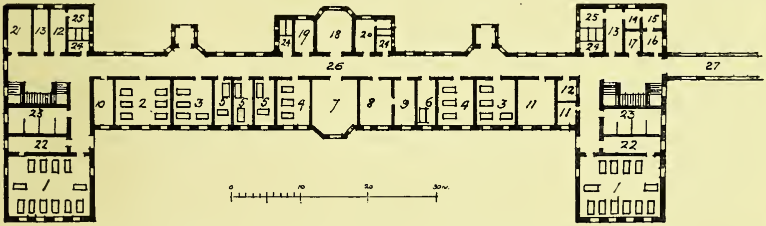

FIG. 21.—GROUND FLOOR PLAN OF SURGICAL PAVILION, THE THIRD HOSPITAL, MUNICH.

1, Twelve-Bed Ward. 2, Six-Bed Ward. 3, Four-Bed Ward. 4, Three-Bed Ward. 5, Two-Bed Ward. 6, Single-Bed Ward. 7, Day Room. 8, Ward Kitchen. 9, Scullery. 10, Nurses' Room. 11, Head Surgeon. 12, Cleaner. 13, Linen Store. 14, 15, 16, Receiving Bath Room, Dressing and Undressing Rooms. 17, Bed Lift. 18, Minor Operation Room. 19, Laboratory. 20, Dirty Linen Room. 21, Permanent Bath Room. 22, Lavatory. 23, Bath Room. 24, Water-closets. 25, Sink Room. 26, Corridor. 27, Cut-off Corridor.

the diseases and patients, rendering them much easier to nurse and control, while at the same time the individuality of the single patients can be much better looked after.

INFECTIOUS DISEASES DEPARTMENTS.

Separate hospitals for infectious diseases as in England are not found in Germany, but a special department is provided in the general hospital. The pavilions are grouped together and are separated by a zone from the rest of the hospital, while a separate entrance to the department is usually provided.

At the Eppendorf Hospital, Hamburg, in 1905-07, a very complete infectious diseases department [fig. 2, Infections-Abteilung] with a total accommodation of 200 beds was erected on the triangular portion of the site to the rear of the tuberculosis department, originally occupied by the epidemic department. It comprises seven detached pavilions of varying sizes, each with its own garden surrounded by a high wire-netting fence. Pavilion No. 56 is for scarlet fever, No. 58 for scarlet fever-diphtheria, No. 61 for diphtheria, No. 60 for measles, No. 65 for isolation, No. 62 for whooping-cough, while No. 63 on the outlying portion of the site is the quarantine pavilion. The nursing and domestic staff have their living and sleeping apartments in their respective pavilions.

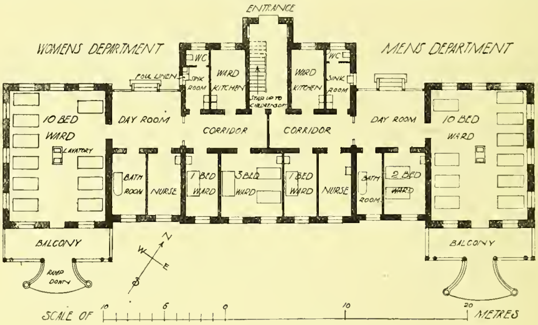

FIG. 22.—GROUND FLOOR PLAN OF SCARLET FEVER PAVILION, EPPENDORF HOSPITAL, HAMBURG.

The quarantine pavilion is of one-story and comprises three entirely separate departments with separate entrances, each containing three- and single-bed wards, with day, nurses', and sanitary-rooms attached.

The scarlet fever pavilion [fig. 22] is of two stories of wards and contains 59 beds, 13 for men, 14 for women, and 32 for children, on the second floor being the apartments for the nursing and domestic staff of the pavilion. As the plan shows, the ground floor is centrally divided into men's and women's sides, all wards facing south-east. The accommodation on each side comprises ten-, two-, and single-bed wards, day-room, nurses' room, ward kitchen, and sanitary-rooms. The first floor provides accommodation for children and is of the same type as the ground floor except that the central division is omitted.

The remaining pavilions of the department are of a similar type of plan, they being all of one story, with the exception of the diphtheria pavilion which is of two stories of wards. The maximum number of beds per ward is twelve, which is found in the measles pavilion.

At the Virchow Hospital, Berlin, the infectious diseases department is under the control of the Royal Institute for Infectious Diseases, which is situated on the opposite side of the Föhrer Strasse, while a separate entrance from this street affords access to the department for those patients in whom the disease has already been recognised. The department comprises six detached one-story pavilions, each with a separate railed garden, symmetrically placed about the transverse axis of the hospital plan, the total normal accommodation being 138 beds, which can, however, be increased to 180 beds when occasion demands. No. 17 [fig. 3] is the quarantine pavilion, No. 18 is for diphtheria, No. 19 to the south is for typhoid fever and the rarer infectious diseases, such as small-pox, cholera, plague, etc., No. 19 to the north is for measles in one half and for erysipelas (men) in the other, No. 20 to the south is for whooping-cough in one half and for erysipelas (women and children) in the other, No. 20 to the north is for scarlet fever, while No. 21 is a special autopsy block for the department for research work.

The quarantine pavilion for the observation of doubtful cases, etc., is centrally divided for men and women, and is of the side corridor type of plan, with all wards facing south and the sanitary-rooms in outshoots to the north. The wards are for two and single beds, and the apartments for the staff of the pavilion are provided on the first floor with access from outside only.

The diphtheria pavilion with 28 beds is of a similar type of plan, the wards containing four, two, and one beds.

The four pavilions Nos. 19 and 20 are all of similar type, each containing 22 beds. They are centrally divided on the ground floor [fig. 23], each department containing five-, three-, two-, and single-bed wards, day and operation-rooms opening from a central corridor, while the ward kitchen, nurses' duty-room, dirty-linen disinfection-room, bath-room, sink-room which contains a fæces disinfector and the water-closets, are disconnected from the wards by a cross-ventilated corridor. On the first floor of each pavilion are the apartments of the medical, nursing, and domestic staffs, only accessible by outside stairs.

At Charlottenburg West End, the infectious diseases department [fig. 5] comprises six detached one-story pavilions, placed one behind the other, adjoining the north-western boundary of the site. No. XI. is the diphtheria pavilion for 30 women and children, Nos. XII. and XIII. of the surgical department provide accommodation for 24 men, and 26 women and children respectively, and Nos. XIV., XV., and XVI. of the medical department provide accommodation for 22 men, 28 women and children, and 28 women and children, respectively.

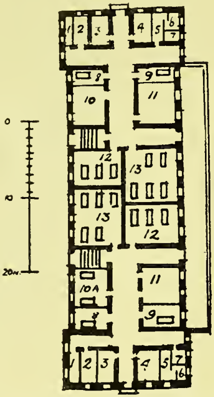

FIG. 23.—GROUND FLOOR PLAN OF PAVILION FOR INFECTIOUS DISEASES, THE VIRCHOW HOSPITAL, BERLIN.

1, Staff Lavatory. 2, Dirty Linen Disinfection Room. 3, Nurses' Duty Room. 4, Ward Kitchen. 5, Bath Room. 6, Sink Room. 7, Patients' Water Closet. 8, 9, Single-Bed Ward. 10, Operating Theatre. 10a, Two-Bed Ward. 11, Day Room. 12, Three-Bed Ward. 13 Five-Bed Ward.

The pavilions [fig. 24] are centrally divided into two similar departments and are of the corridor type of plan, all wards facing south-west, and comprising in each department four, three, and two two-bedded wards. Patients enter by a glazed entrance-hall through the bath-room, where they are undressed, bathed, and dressed in hospital clothing. Doctors and nurses enter from either end through a vestibule, which contains provision for the disinfection of the hands and the changing of gowns. The ward kitchen with receiving window to outside for the delivery of the food opens from the vestibule so as to be as detached as possible from the wards. Adjoining the day-room is the doctors' and nurses' duty-room, and the operation-room for septic cases, the dressings sterilisers for the latter being placed in the vestibule. The sanitary-rooms are grouped together in the central outshoot, and comprise patients' and staff water-closets, a small room for urine and sputum examination, the sink-room which contains a cupboard for the retention of fæces etc., a slop-sink disinfector for the disinfection of the contents of bed-pans before discharge into the drains, a wash-up sink, and the dirty-linen disinfector which opens into a sorting-room with direct access to outside for the conveyance of the disinfected linen to the laundry. On the central first floor of each block are the apartments for the staff of each pavilion. Attached to the disinfection-house is a small discharge department, comprising undressing-, bath-, and dressing-rooms, for patients on discharge from this department.

In those hospitals where the site does not permit of the erection of a number of one-story blocks, each for a different infectious disease, it is usual to erect one or more large blocks of more than one story, separated horizontally by the floors and vertically by partition-walls into separate departments for different diseases, each department having a separate entrance.

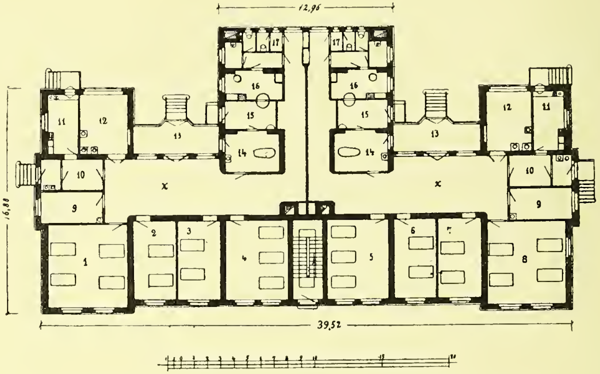

Fig. 24.—Ground Floor Plan of Pavilion for Infectious Diseases, the West End Hospital, Charlottenburg

1, 8, Four-Bed Wards. 2, 3, 6, 7, Two-Bed Wards. 4, 5, Three-Bed Wards. 9, Doctor and Nurses' Duty Room. 10, Vestibule. 11, Ward Kitchen. 12, Operation and Bandaging Room. 13, Covered Entrance Hall for Patients. 14, Bath Room and Lavatory. 15, Disinfecting and Linen Sorting Room. 16, Disinfecting and Sink Room. 17, Patients' Water Closet.

At Düsseldorf the infectious diseases pavilion is of three stories of the corridor type of plan. The ground floor is centrally divided into two departments, one for scarlet fever, the other for measles. The first floor, reached by a separate staircase, contains the department for diphtheria, and the second floor again, reached by a separate stair, contains the department for surgical infectious diseases. On the third floor are the apartments for the medical and nursing staff of the pavilion.

At Munich III. the infectious diseases pavilion is of two stories, and contains 55 beds in wards of from one to four beds in four completely separated departments, for measles, diphtheria, scarlet fever, and erysipelas respectively, each department having a separate entrance.

At Dresden Johannstadt there are two large three-story pavilions for infectious diseases, each centrally divided into two departments for different diseases, and by their floors for men, women, and children respectively. One pavilion contains in one department diphtheria, in the other scarlet fever, while the other pavilion contains measles in one department and the ophthalmic department temporarily in the other. On the roof floor are the staff apartments, and accommodation for the relatives of sick children.

In the majority of diphtheria pavilions special wards are provided, which can be used as steam-rooms, as for example at Dresden Johannstadt, where the walls and floor are tiled, and the ceiling double and of arched form, so as to prevent the condensed water dropping on the patient. Fully equipped operating theatres again are usually provided in the pavilions for tracheotomy.

A special observation pavilion, of considerable interest, is found in the Düsseldorf General Hospital, where all patients with infectious diseases are received and examined, four separate departments, each comprising a ward for two beds, bath-room, water-closet, and separate entrance, being provided for doubtful cases.

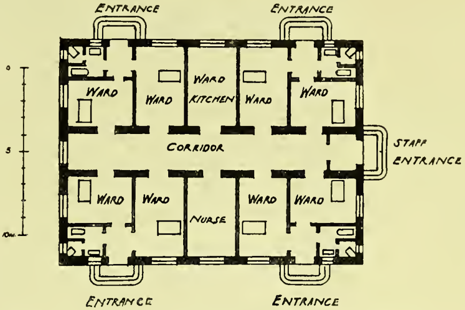

Fig. 25.—Ground Floor Plan of the Children's Quarantine Pavilion, The Royal Charité Hospital, Berlin.

The children's quarantine pavilion [fig. 25] at the Royal Charité Hospital, Berlin, shows a similar type of building with four separate departments, each with two single-bed wards, bath, and water-closet, and separate entrance, and a common ward kitchen and nurses' room, the central corridor being for the use of the medical and nursing staff only.

PRIVATE PATIENTS' PAVILIONS.

The majority of the general hospitals provide special accommodation for private patients, who pay a larger sum per day than ordinary patients, the wards containing one or two beds and being elaborately appointed. A special pavilion is usually provided for this purpose, with its own grounds and gardens. The normal type of plan consists of the series of wards lying to the south of a long corridor, while the service, treatment, and sanitary-rooms are in outshoots to the north, as at Hamburg Eppendorf and St. Georg, Nuremberg, Schöneberg, etc. At Cologne Lindenberg the pavilion is connected to the administrative block, the ground floor being for surgical cases, and the upper floors for medical. The pavilions always contain fully equipped operation-rooms and treatment-rooms.

CHILDREN'S DEPARTMENTS.

In some of the older hospitals the pavilions for children are of the same type as those of the medical and surgical departments, but in the more recent hospitals special pavilions are generally erected.

At Düsseldorf the Children's Clinic is particularly good. At the entrance is a small isolation department for four beds, so as to allow of the observation of doubtful cases and prevent the introduction of infection. The ground floor is for infants, and comprises four wards each with ten cots. In an outshoot is a most interesting department [fig. 26] of heated isolation-rooms for prematurely-born and weakly children. It comprises six cells or boxes, each for two cots, constructed in the lower portion of marble and in the upper of two thicknesses of plate-glass in nickel-plated steel frames. The elaborate apparatus for controlling the temperature, the degree of humidity, and the ventilation of each cell, is controlled from the central corridor. Each child has its own feeding and other utensils in glazed compartments attached to the end of each bed. The first floor of the Clinic contains the wards for the older children, the basement a very fine milk-kitchen, with adjoining rooms, while in an outshoot are the laboratories of the Clinic, lecture-theatre, and library.

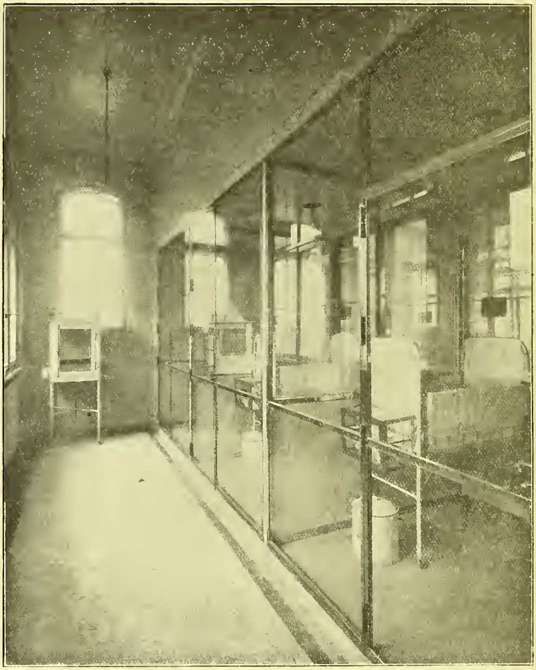

FIG. 26.—THE ISOLATION DEPARTMENT, THE CHILDREN'S CLINIC, DÜSSELDORF GENERAL HOSPITAL.

(To be continued.)

MODERN GERMAN HOSPITAL CONSTRUCTION.—II.

By William Milburn, Junr., B.Sc. [*A.*], Henry Saxon Snell Prizeman 1908, Godwin Bursar 1910.

(*Continued from p.* 56.)

CHILDREN'S DEPARTMENTS—*continued.*

At the Royal Charité Hospital, Berlin, there is a very fine and complete children's clinic, comprising an out-patients' department, educational block, pavilion for non-infectious diseases with 44 beds, a quarantine or observation block, already described, with eight beds, four pavilions for scarlet fever, whooping cough and measles, diphtheria, and mixed infection, respectively, with 49 beds, and a block for experimental animals. At the entrance to the out-patients' department are special isolation and examination rooms for doubtful cases, with direct access to the quarantine or infectious diseases pavilions, so as to prevent the introduction of infectious cases into the out-patients' department proper, which comprises a large waiting-hall, examination, and operation-rooms. The educational block comprises the directors' and adjoining rooms, a large lecture-theatre seating 120, with rooms for patients adjoining, and on the first floor laboratories for chemical, microscopical, and bacteriological work. The pavilion for non-infectious cases is connected to the out-patients' and educational block by a closed corridor. On the ground floor is the infants' department with 14 beds, the milk-kitchen and annexes, and the "box" ward with 10 beds [fig. 27] for young children, in which, in order to prevent the conveyance of disease, the beds are separated from one another by glazed screens of iron construction about six feet in height. Each child has its own feeding

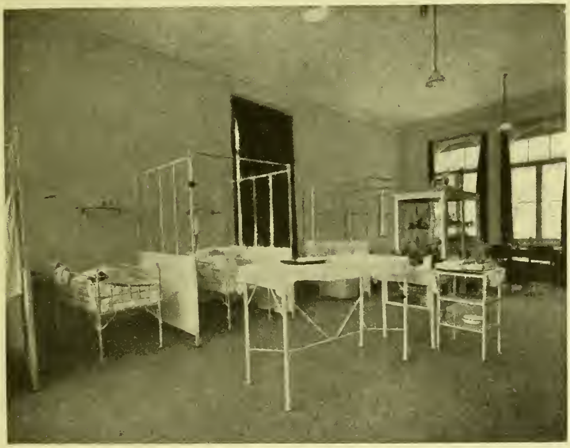

Fig. 27.—The "Box" Ward, the Children's Clinic, Royal Charité Hospital, Berlin.

utensils on plate-glass shelves, while robes only to be used for each particular "box" by the doctor or nurses are hung at the end of each screen. On the first floor is the accommodation for older boys and girls, comprising two ten-bed, two two-bed wards, an operation-room, etc.

Other fine children's pavilions are found at Cologne Lindenburg, where the children's clinic is of three stories, with the out-patients' department and scientific rooms on the ground floor, the girls' and infants' department on the first floor, and the boys' and private patients' department on the second floor, the maximum number of beds per ward being ten; and at the Frankfort City Hospital, where detached blocks for children are provided for medical, surgical, and skin diseases respectively, the equipment here being particularly worthy of note, each infant for example having a separate bath and feeding utensils.

MATERNITY AND GYNÆCOLOGICAL DEPARTMENTS.

A large number, though not all, of the German general hospitals contain special departments for maternity and gynæcological cases, and the buildings are always designed to meet the special requirements.

One of the best is at the Eppendorf Hospital, Hamburg, where a special department was erected in 1899 on the western portion of the site beyond the domestic blocks. It consists [fig. 28] of a central administrative block, connected by a one-story closed corridor to the lying-in pavilion, space being reserved on the opposite side of the administrative block for a second lying-in pavilion of similar type, while an entirely detached pavilion is provided for septic cases. The administrative block contains in the basement the kitchen and maids' apartments, on the ground floor the doctors' and nurses' rooms, receiving rooms for patients, and two labour rooms with a sterilising room between, while on the first floor are wards for private

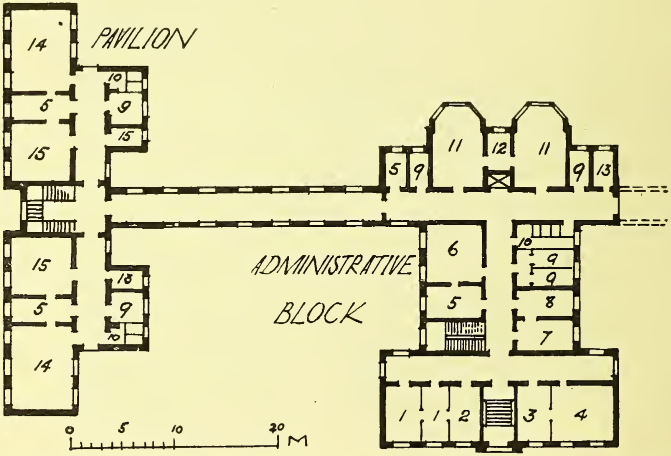

Fig. 28.—Ground Floor Plan of the Maternity Department, the Eppendorf Hospital, Hamburg.

1, Head Sister. 2, Office. 3, Waiting Room. 4, Examination Room. 5, Nurse. 6, Nurses' Dining Room. 7, Head Doctor. 8, Microscopical Room. 9, Bath Room. 10. Water-closets. 11. Labour Room. 12, Sterilising Room. 13, Ward Kitchen. 14, Four-Bed Ward. 15, Three-Bed Ward.

patients and gynæcological cases, two operation-rooms, and staff apartments, and on the roof floor large dormitories for patients. The lying-in pavilion is of three stories, and each floor is centrally divided by the hall and staircase into two lying-in stations, each of which comprises two wards for four and three beds respectively, with nurses' room between, and ward kitchen, bath-room, and water-closets to the opposite side of the corridor.

At Hamburg St. Georg, Virchow Berlin, Frankfort, Charlottenburg, and the Charité Berlin, the maternity and gynæcological departments are contained in blocks designed on the corridor system, the wards containing a small number of beds each.

At Düsseldorf the women's clinic is situated on the second floor of the surgical pavilion, particular attention being paid to the labour rooms, which are treated as ordinary homelike rooms, and are preferred to the large labour rooms so often seen, designed on the lines of operating-theatres and containing a large number of cases.

With regard to special hospitals, a very fine example is the Royal Women's Clinic, Dresden, opened in 1903, which comprises four blocks, the administrative block, the maternity and gynæcological pavilion, the septic pavilion, and the domestic and technical block. The pavilion is of three stories of the corridor type of plan and contains 148 beds, the wards containing a maximum number of eight beds, and the operating and labour rooms being in the centre of the pavilion. The septic pavilion is of one-story, and contains two six-bed and two single-bed wards, labour room and adjoining rooms.

Another very fine special hospital is the Maternity Hospital at Cologne, opened in 1908, which comprises an administrative block, a pavilion for maternity and gynæcology with 144 beds, an isolation block with 22 beds, a domestic block, boiler-house block, and directors' house.

OPHTHALMIC, AND NOSE, THROAT, AND EAR DEPARTMENTS.

As a rule for the ophthalmic, and the nose, throat, and ear departments, special wards are set apart in the surgical pavilions, but in some hospitals special blocks are erected for these departments.

At Hamburg Eppendorf, a special three-story block with 120 beds contains the ophthalmic department. It is of the corridor type of plan, the corridor being to the south and widened out for use as a day-room, and the wards contain a maximum number of eight beds, the usual operating theatres, examination and testing rooms being provided. At Dresden Johannstadt, until the erection of a special block for the purpose, the ophthalmic department is temporarily contained in one half of one of the infectious diseases pavilions; at Düsseldorf special rooms are contained in the surgical clinic; and at Frankfort a special block has recently been opened.

A very fine special clinic, the Royal Ophthalmic Clinic, has recently been opened at Munich. The block is of three stories, and contains on the ground floor the administrative, receiving, and out-patients' department, in the basement the domestic and technical rooms, and the bathing department, and on the upper floors the wards and operating theatres, three separate departments being arranged for private patients, aseptic, and septic cases respectively. The equipment is of the latest and best type, and the whole clinic is most complete.

In the Royal Charité Hospital, Berlin, the throat, nose, and ear departments are contained in a special block of the corridor type. On the ground floor are the out-patients' departments, on the first floor the throat and nose clinic, and on the second floor the ear clinic, the equipment throughout being particularly worthy of notice.

SKIN AND VENEREAL DISEASES DEPARTMENTS.

The majority of the general hospitals contain special departments for skin and venereal diseases, well separated for men and women, and with separate airing courts with railings or high walls, so as to prevent contact of these cases with the other patients in the hospital.

At Nuremberg, Schöneberg, and the Virchow, Berlin, good examples of blocks for these departments are found, in the first two of two-stories with a central corridor, and in the last of three-stories with a side corridor. At Düsseldorf there is a very fine clinic consisting of two two-story pavilions for men and women respectively of the corridor type of plan, connected to a central one-story block, which contains the light treatment and operation-rooms.

In all these blocks a large provision of special rooms for treatment by the Finsen Light and Röntgen rays, operating theatres with adjoining rooms, special baths, and laboratories for research, are always found.

MENTAL DISEASES DEPARTMENTS.

Special provision is, as a rule, made in the general hospitals for the reception of mental diseases, and particularly so in the centres of medical education and University hospitals.

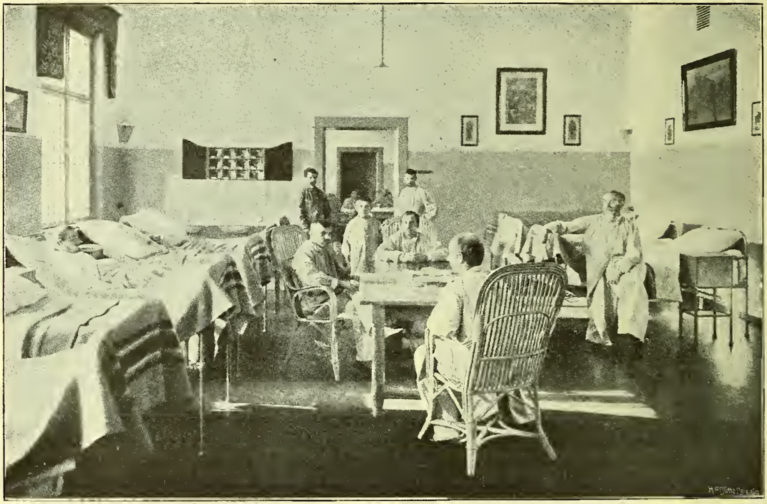

Fig. 29.—Ward, the Royal Psychiatrical Clinic, Munich.

The blocks, examples of which are found at Hamburg Eppendorf, Nuremberg, Dresden Johannstadt, and the Virchow Berlin, are usually well away from the rest of the hospital, and separate walled airing courts always under observation are provided for men and women. Observation wards containing some six beds or so for quiet patients are provided, while violent patients have single wards. All fittings are of the asylum type and can only be controlled by the attendants, the doors being self-locking, window-cords, fastenings, and blind-cords being in locked wall-boxes, water-closets self-flushing, and the arrangements for heating, ventilation, and lighting, external to the wards.

At Munich the Royal Psychiatrical Clinic attached to the University is said to be the finest in the world. It was opened in 1904 and is situated in the "clinical" quarter of the city, the total accommodation being 120 beds. It is a large block of three stories with outshoots at either end and in the centre, on the corridor plan, the corridor facing the street and the rooms opening on to the internal courts. In the centre of the ground floor is the large entrance-hall, administrative, students', and out-patients' rooms, and on the first floor the large clinical lecture-theatre. One wing is for men, the other for women, on the ground floor being the private patients' department, on the first floor the receiving and observation departments [fig. 29], and on the second floor the observation and quiet patients' departments. The laboratories and research rooms are on the roof floor, and the kitchens and domestic rooms in the central out-shoot.

At the Royal Charité Hospital, Berlin, the planning of the Psychiatrical and Neurological Clinic, which contains 200 beds, is particularly good. It comprises three series of buildings connected together by a central corridor. The first is the educational and neurological clinic, which contains on the ground floor the administrative and staff rooms, the laboratories and research rooms, and the out-patients' department, and on the first floor the clinical lecture-theatre with seating for 185, and the neurological clinic with wards for men and women. The second block is the psychiatrical clinic of two stories, and contains in either wing the accommodation for quiet patients, while the third blocks of one-story are the "villas" for troublesome patients, with single wards.

At Cologne Lindenburg one finds a good clinic, and again at Halle there is a very complete special clinic.

The equipment of these institutions is always very fine and complete, they being largely intended for study and research, and such points as the special cinematographic apparatus for obtaining and recording the facial expression and movements of the insane, or the large provision of baths for continuous baths, by which the violent patients are treated instead of employing padded-rooms, are of considerable interest.

TUBERCULOSIS DEPARTMENTS.

A few of the general hospitals have special departments for tuberculosis—for example, at Hamburg Eppendorf in recent years a department has been formed in the pavilions of the former isolation department, verandahs having been added for open-air treatment; at Nuremberg a special pavilion on the corridor plan was erected in 1904 for female consumptives; and at Cologne Lindenburg a large three-story pavilion is employed for tuberculosis.

It is, however, in the numerous consumptive sanatoria that tuberculosis is usually treated, very fine examples being found at Beelitz-i.-Mark.

PAVILION DESIGN.

The usual orientation for pavilions when there are windows on both sides of the wards is north and south, though when prevailing winds or the shape or levels of the site have to be taken into account this rule may be modified. In pavilions on the corridor system, when there are windows on one side of the wards only, it is usual to obtain if possible an aspect due south. The distance between adjoining pavilions in relation to the height from the ground to the eaves is invariably twice and usually more—at Hamburg St. Georg it is 2½ times, and at the Virchow Berlin it is 5.8 times. At Hamburg Eppendorf the pavilions in adjoining rows are alternated, so as to obtain better ventilation and better aspect for the day-rooms.

The prevailing form for the wards is rectangular. At the Virchow Berlin the 20-bed wards are 69 feet long by 29 feet 6 in. wide, and the curved ceiling is 10 feet 6 in. high at the springing and 15 feet 9 in. at the crown. At Hamburg Eppendorf the 30-bed wards are 84 feet 6 in. long by 28 feet wide and 16 feet 6 in. high in the centre. At Charlottenburg West End the 22-bed wards are 75 feet 6 in. long by 29 feet 6 in. wide and 15 feet 9 in. high, and at Hamburg St. Georg the 16-bed wards are 44 feet 2 in. long by 30 feet 4 in. wide and 13 feet 6 in. high. The beds are arranged as in England on either side of the ward, but they do not as a rule alternate with the windows, and there is usually a space of about three feet between the head of the bed and the wall so as to allow of free ventilation and easy access for the doctor and nurses. The wall space per bed is smaller than in England, being 5 feet 7 in. at Eppendorf, 5 feet 6 in. at St. Georg, 6 feet 3 in. at the Virchow, 6 feet 10 in. at Charlottenburg, and 5 feet 10 in. at Cologne; and the floor space is correspondingly smaller, it being 78 square feet at Eppendorf, 83 square feet at St. Georg, 97 square feet at the Virchow, 101 square feet at Charlottenburg, and 84 square feet at Cologne; while the cubic space is again lower, it being 1290 cubic feet at Eppendorf, 1129 cubic feet at St. Georg, 1430 cubic feet at the Virchow, and 1590 cubic feet at Charlottenburg.

The small wards are almost invariably rectangular, and their floor and cubic space corresponds to that of the large wards.

As a rule all wards contain one or more lavatory basins with hot and cold water supply, for the doctor or nurses' use after attending each patient, and it is held that the presence of these lavatories inculcates habits of cleanliness in the patients. They are usually bracketed from the walls at each end of the ward, but at Hamburg St. Georg they are placed on a pedestal in the centre of each ward and are said to be more accessible. In some few hospitals slop-sinks are found in the wards, and in some of the wards of the psychiatrical clinics water-closets are provided. In surgical wards sterilisers for instruments or dressings are often bracketed from the walls.

The practice with regard to the reception and admission of patients into the wards differs, at the Hamburg hospitals, for example, several pavilions being set apart for the reception of all new patients, who remain in these wards for twenty-four hours before being admitted to their own pavilion. At such hospitals as, for example, the Virchow Berlin, Cologne Lindenburg, and Munich III., special receiving rooms are placed at the entrance to each pavilion in which all new patients are undressed, bathed, and dressed in hospital clothing, and then conveyed to their ward. Their own clothing is placed in bags, disinfected if necessary, and then stored either in a central clothes-store or in clothes-stores in each pavilion, some hospitals following the first method and others the second.

All of the modern pavilions contain special rooms for the doctor for treatment, which in the surgical pavilions are completely equipped as operating theatres for the performance of minor operations and surgical dressings.

The rooms for the nursing and domestic services are always well designed and arranged, and the equipment of the ward kitchens [fig. 30] is very thorough, comprising as a rule steam hot-closets and plates, steam boiling-pans, gas-rings, sinks, and ice-chests. A separate scullery is often provided, as at Munich III. or Charlottenburg West End. It is not usual to place inspection windows between the ward kitchen and the ward. Large food-stores or pantries are not often provided, there usually being small food-stores in the kitchens. A nurses' duty-room or head-sister's room is often provided, as at the Virchow Berlin. When the nurses sleep in their pavilion, their rooms, in the older type, are usually on the same floor as the wards, but in the more recent, as Schöneberg, the Virchow, or Charlottenburg, their apartments are in an upper story.

In the treatment of the day-rooms for patients attempts are often made to depart from the institutional appearance so often seen, and to obtain as far as possible a homelike or domestic effect, as at Hamburg St. Georg [fig. 31], or at the Frankfort City Hospital, where the artistic treatment is particularly noticeable, there being in the corner of each day-room a small built fountain. Balconies are provided, as at St. Georg Hamburg, or open halls, as at Cologne Lindenburg, while the day-rooms at Eppendorf, Dresden, or Frankfort Bürgerspital, can be practically turned into open verandahs, the latter, as can be seen from the photograph [fig. 32], being almost all glass.

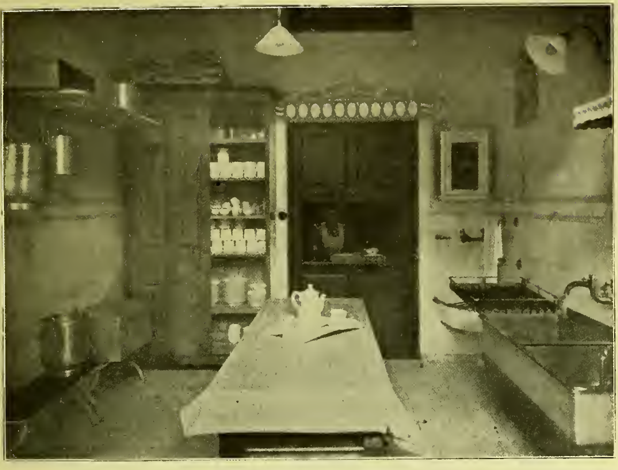

FIG. 30.—WARD KITCHEN, THE ST. GEORG HOSPITAL, HAMBURG.

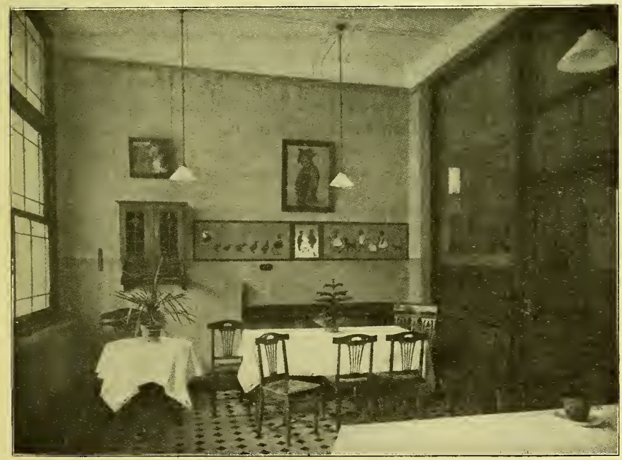

FIG. 31.—DAY ROOM IN THE CHILDREN'S DEPARTMENT, ST. GEORG, HAMBURG.

The arrangement of the sanitary-rooms is always practical and convenient, and it is of interest to note the much greater provision of sanitary apparatus and floor space in bathrooms, lavatories, sink-rooms, and water-closets, in such pavilions as the Virchow or Munich III., in comparison with an ordinary English pavilion. The lavatory basins are as a rule provided in a separate room from that which contains the baths. The bath-rooms are large and often contain two plunge-baths, sitz, and douche-baths. In the older pavilions the slop-sinks are contained in the ante-room to the water-closets, but in the more modern completely equipped and separate sink-rooms are provided. The water-closets are separated from one another by partitions of marble, flush or framed wood, etc., raised from the ground and some six or seven feet high, and the room in which they are contained is usually of large dimensions. The non-disconnection of the sanitary rooms by a cut-off lobby is a point in which the German plans differ greatly from the English, and at first sight appears to condemn the design, but where the rooms are well placed and modern and up-to-date apparatus employed it is difficult to note any great objection to the non-disconnection.

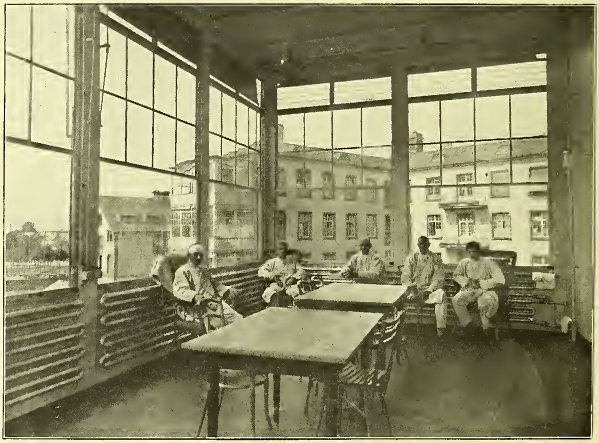

Fig. 32.—Day Room, Frankfort, Bürgerspital.

In the treatment of the dirty linen there are three methods in vogue in Germany. The first is by linen-shoots from the different floors to a room in the basement, where the linen is collected and sorted, as at Hamburg Eppendorf and St. Georg, and Cologne Lindenburg, special attention being paid to the shoots so that they can be easily cleaned; the second is found, for example, at the Virchow Hospital, Berlin, or Charlottenburg West End, where two rooms are provided, the linen being collected in the first, sterilised by boiling in a disinfector which is built into a glazed partition between the rooms, sorted in the second room, and then despatched to the laundry; while the third method is that employed at Munich III. and certain other South German hospitals, where the linen is collected in a special room, and placed in closed receptacles, which are transported to the basement by a lift and then by subways to the laundry.

CONSTRUCTION OF PAVILIONS.

The walls are generally constructed of brick, usually solid, hollow walls being the exception, and are very often rough-cast externally. There is usually a complete open basement, which contains the heating and ventilating apparatus. Floors are invariably fireproof, of reinforced concrete construction, or else of brick arches on rolled-steel joists, the latter being a favourite form. Pitch roofs are steel or timber framed and covered with tiles—glazed tile, as at Munich III. and Dresden, being a favourite material. A cheaper form of roof construction much employed is that found at Hamburg Eppendorf and St. Georg, or Nuremberg, where flat timber framed roofs are covered with layers of tarred felt, asphalt-felt, or one of the prepared roofing materials, fixed down with pitch, the whole being covered with a layer of sand and a layer of gravel.

Internally the most common materials for finishing the floors of the wards with are tiles, terrazzo, or linoleum. The tiles have a dull surface and are often laid in patterns, and the angle between the wall and floor is rounded in tiles. The terrazzo is laid in sections, with brass strips between, so as to prevent cracking. Linoleum is now being very largely employed and is greatly favoured. Sometimes, when on an upper floor, it is laid in a layer of cork, so as to deaden the sound. The angle between the wall and floor is formed in various ways—at Frankfort Bürgerspital and Hamburg St. Georg the linoleum is turned up the wall for about six inches and the edge is closed with a special metal clip, or as at Cologne Lindenburg with a wood fillet, while in the Royal Ophthalmic Clinic, Munich, the angle is formed in terrazzo, there being a close joint on the floor between the terrazzo and linoleum. Linoleum is also very largely employed as an inlay to corridors. Wood floors are exceptional, although oak wood-block floors are occasionally found. The floors to ward kitchens and sanitary-rooms are generally laid with tiles.

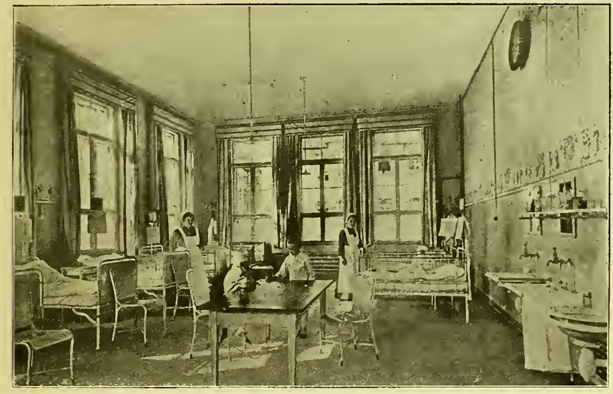

FIG. 33.—CHILDREN'S WARD, THE AUGUSTE VICTORIA HOSPITAL, SCHÖNEBERG.

The walls are generally plastered with ordinary lime plaster and all angles are rounded, external angles very often having rounded iron covering pieces to six feet above the floor. Dados to wards are sometimes formed in cement and occasionally with glazed tiles. The dados are usually oil-painted and the walls above distempered in light tones, the colours ranging from grey to green. At Düsseldorf the dados are formed of linoleum. Ceilings are usually fireproof and distempered. In some cases decorative work is introduced on the walls, as at the Virchow Hospital, while in the children's wards [fig. 33] an appropriate stencilled frieze is often provided. In infectious diseases wards the walls are often enamel painted. Ward kitchens and sanitary-rooms usually have glazed tile dados.

The windows are almost invariably casements opening in, with fall-in fanlights over the transom, and are usually constructed of hard wood. They are usually double-glazed with an interspace of an inch or so, or else two entirely separate casements are provided with an interspace of about nine inches. In the new infectious diseases department at Hamburg Eppendorf and in the Frankfort City Hospital patent reversible sliding sash windows are employed, and at Cologne Lindenburg large mullioned windows with basement and fixed sashes are used. Window-sills are formed in various ways, of tiles, granite, marble, wood, or plaster, and the jambs are often tiled. Wood roller sun blinds are often fitted, and internally casement curtains with valances are usual. The fanlight-openers and sash-fasteners are often of very interesting patterns. At Hamburg Eppendorf the actual glazed area per bed is 15.2 square feet, and at the Virchow Berlin it is 14.9 square feet, but the amount varies greatly in different hospitals.

The doors are usually single—double, swing, or sliding-doors not often being found. They are generally wood-panelled without mouldings, or else flush. At Düsseldorf and the Royal Charité, Berlin, linoleum-covered doors are employed. Wood door frames are exceptional, angle iron of various sections well anchored into the wall being almost invariably employed, and when the door linings and architraves are tiled an excellent door frame is obtained.

Furnishings are as simple as possible and often most artistic in design. The beds are of metal construction, wood insets at the head and foot being common, and if they do not have casters special side lifting frames are provided, so as to wheel them on to the terrace. The bed tables are constructed of glass and iron. Chairs are of metal construction or of wood. Very few cabinets or tables are found in the wards, and as far as possible they are of glass and iron construction.

OUT-PATIENTS' DEPARTMENTS.

The great out-patients' departments with waiting-halls for 300 or 400 patients, which one finds in London or in the larger English cities, are not found in Germany. There these departments, which are known as polyclinics, are attached as a rule to the University hospitals, and not to the general hospitals, while large numbers of out-patients are treated in the numerous private polyclinics which one finds in almost every street. Generally speaking, in University hospitals a polyclinic is attached to each clinic, so that instead of a common waiting-hall, as in England, for medical, surgical, children's, gynæcological, etc., cases, a separate waiting-hall has to be provided for each department.

Some of the finest examples are the polyclinics of the Royal Charité Hospital, Berlin, among which the surgical polyclinic attached to the surgical clinic comprises a central waiting-hall, opening off from which are examination, operation, and treatment rooms, while in the basement are special massage and bath-rooms; the nose, throat, and ear polyclinic is again very complete and well equipped, as is the neurological polyclinic, the children's polyclinic, and the light institute. The new medical polyclinic which is to be shortly erected will also be most complete.

At Munich the ophthalmic and psychiatrical polyclinics, both attached to their respective clinics, are very fine, and at the St. Georg Hospital, Hamburg, very complete polyclinics for surgical, ophthalmic, and nervous diseases, and throat, nose, and ear diseases are found.

As a rule in the design of the polyclinics separate return ways for patients are not provided, while when room does not admit of a separate building and in very many cases for preference, there is no hesitation in placing one or two stories of wards over the polyclinic.

OPERATION-HOUSES.

As a rule each surgical pavilion is provided with a room fitted up as a small operating theatre, in which all examinations, dressings, bandaging, and minor operations can be performed, while the operating theatres proper for the major operations are grouped together in one block, known as the operation-house, which is placed in the centre of the surgical department between the men's and women's sides, and situated if possible close to the entrance to the hospital so that accident cases may be received direct from the ambulance-wagon and promptly attended to.

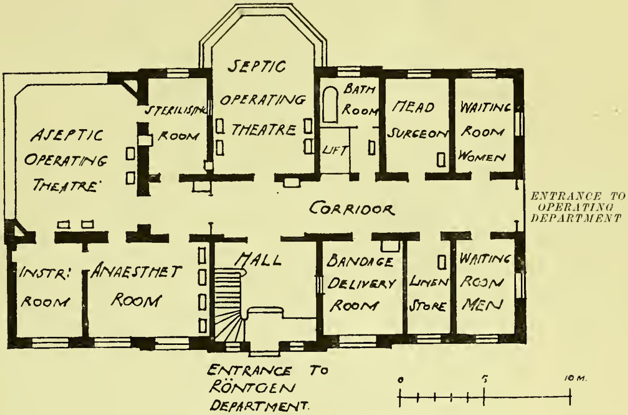

FIG. 34.—GROUND FLOOR PLAN OF THE OPERATION HOUSE, HAMBURG ST. GEORG.

The former tendency to keep the operation-house entirely separate and detached from the pavilions, as at Hamburg Eppendorf and St. Georg, the Moabit, Am Urban, or Nuremberg, is passing away, and the latest hospitals show it connected to the pavilions by closed corridors, so as to obviate the transport of the patients through the open, which in bad weather becomes most difficult and causes considerable inconvenience to the staff.

Two sets of operating rooms are usually provided for aseptic and septic cases respectively, and a strict separation is maintained between them.

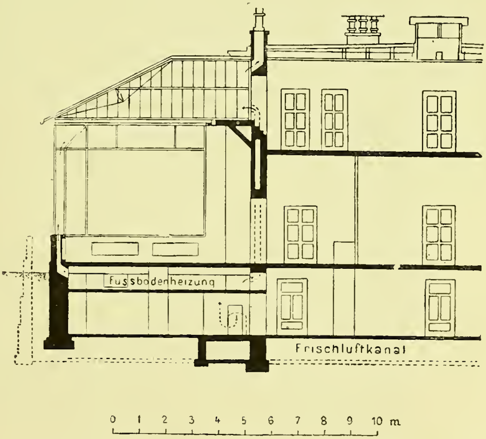

FIG. 35.—SECTION THROUGH THE ASEPTIC OPERATING THEATRE, HAMBURG ST. GEORG.

One of the finest of the modern German operation-houses is found at the St. Georg

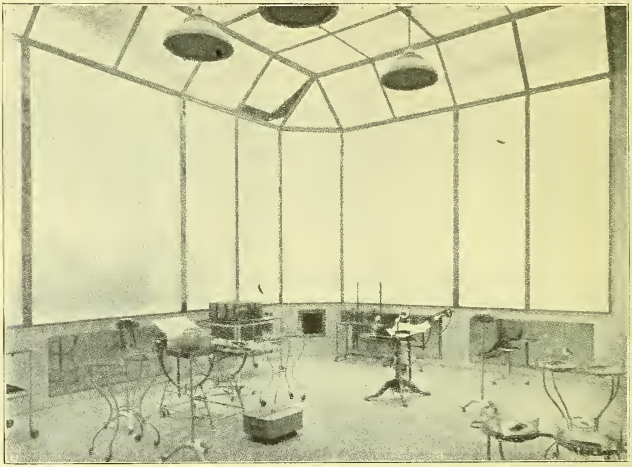

FIG. 36.—THE ASEPTIC OPERATING THEATRE, HAMBURG ST. GEORG.

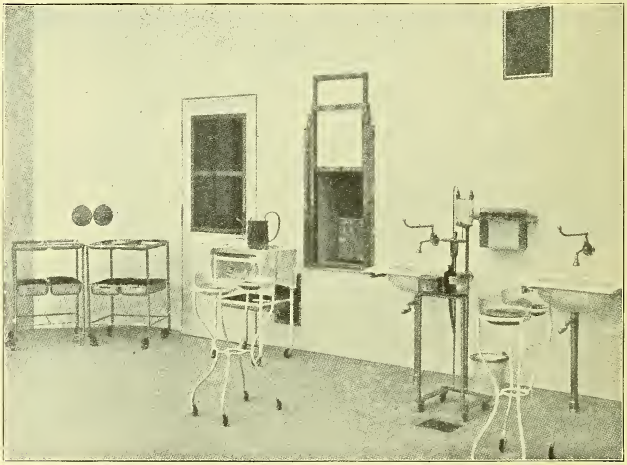

FIG. 37.—THE ASEPTIC OPERATING THEATRE, HAMBURG ST. GEORG, VIEW OF WALL TO THE STERILISING ROOM.

Hospital, Hamburg. It is a detached block [figs. 34 and 35] situated in the centre of the surgical department between the men's and women's sides and close to the main entrance to the hospital. The entrance to the operating department is protected by a glazed shelter for the ambulance-wagon, and the central corridor gives access to the rooms, which comprise waiting-rooms for men and women, head-surgeon's room, patients' bath-room, linen and bandage rooms, the septic operating theatre, and the aseptic operating rooms, comprising the theatre, anæsthetising, sterilising, and instrument rooms, this latter series of rooms being separated from the former by a glazed screen across the corridor.

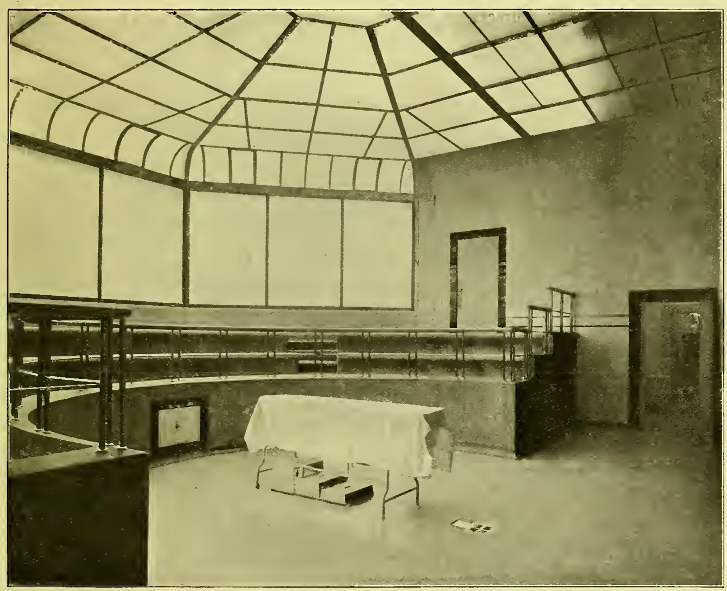

Fig. 38.—Operating Theatre, Düsseldorf General Hospital.

The aseptic operating theatre [fig. 36] is reserved only for completely clean operations, the doctors and nurses taking the greatest sterile precautions and wearing rubber shoes and sterilised caps and gowns. It is 27 feet long by 23 feet wide and 16 feet 6 in. high, and has two sides and the ceiling completely glazed. The floor is of tiles which slope to floor traps, and the walls are covered with white glazed tiles. The glazing is double of obscure plate-glass in nickel-plated steel frames, with an interspace of 20 in. or sufficient to allow a man to clean the glass without entering the theatre.

In order to prevent the theatre cooling and to prevent condensation on the glass, owing to the great glazed surface, what is termed a "mantle" heating is employed, by which the whole room is surrounded as it were by a mantle of hot air. Warm air passes from the heating chamber under the floor and up between the double glazing in the glazed sides, and in ducts on the wall sides into the overlight space, from whence it returns by angle ducts to the heating chamber, where it is warmed again and the process continued. In addition to this heating, radiators are placed below the window-sills in recesses which are closed with flush nickel plates, and as again the fresh air for ventilation is warmed before entering, the theatre even in the coldest weather can be kept at a temperature of 86° Fahr.

For the ventilation of the theatre a mechanical system is employed with a special sand-filter, for which it is claimed that it renders the air almost germ free. The artificial lighting is obtained from three pendants suspended from the ceiling with Osram lamps, the total lighting obtainable being 3150 c.p. The fittings comprise four lavatory basins [fig. 37], which are of white faïence bracketed from the walls, each resting on four points only, while the supply is combined hot and cold with elbow-action fittings and knee-action waste. The two basins to the sterilising room wall are supplied with sterilised water at the supply temperature. The remaining fittings are all moveable and of the latest patterns.

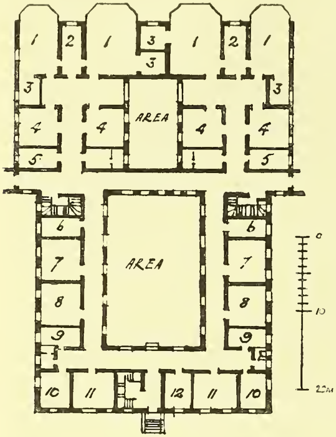

Fig. 39.—Ground Floor Plan of the Operation House, the Virchow Hospital, Berlin.

1, Operating Theatre. 2, Sterilising Room. 3, Instruments. 4, Anæsthetising Room. 5, Cloak Room. 6, Linen. 7, Plaster Bandaging. 8, Microscopical Room. 9, Apparatus. 10, Surgeon. 11, Director. 12, Attendant.

The whole theatre can be washed down, a hose and piping being provided for the purpose, and in addition steam can be turned into the room, causing all floating particles to descend.

The septic operating theatre, which is used for all unclean and suppurating cases and for large bandage changings, is lighted by a glazed bay with overlight, and is similar in its construction and fittings to the aseptic theatre, with the exception that filtered air is not provided.

On the first floor of this block is the plaster bandaging room, nurses' rooms, and the Röntgen department, access to which is had by a separate entrance and staircase.

At the Düsseldorf General Hospital [fig. 38] the operating theatres are contained in the surgical clinic, which is planned on the corridor system, with two internal areas. The theatres are three in number, one being used for septic and one for aseptic operations, and the other for bandage and clinical work. Three rows of seating in terrazzo are provided for the accommodation of students, who enter by a separate staircase from their cloak-room in the basement. The floor is of terrazzo, sloping to the central floor trap, and the walls have a glazed tile dado, above which the plaster is enamel painted. The glazed area is very great, and a complete overlight is provided. The heating is by a "mantle" system, as at St. Georg, Hamburg. Here, however, no system of mechanical or natural ventilation is employed, the room prior to the operation being flushed with fresh air by opening the casement windows, which are then closed, and the room brought to the required temperature, after which the operation is performed in an absolutely still atmosphere, so that all air currents or movements of dust are avoided. This method of operating in a perfectly still atmosphere is also employed at the Virchow Hospital, Berlin, Charlottenburg West End, and Schöneberg, and is now being largely adopted. The lighting is by electric arc-lamps suspended in the overlight space and provided with large reflectors. This, again, is a very prevalent system of lighting the German operating theatres, as all exposed lighting fittings are avoided. The theatre itself contains no fittings of any description beyond the operating table, separate rooms being provided for doctors' and nurses' ablutions, anæsthetising, sterilising, etc., and this tendency also to remove all fittings from the theatres is found in many hospitals.

At the Virchow Hospital, Berlin [fig. 39], the operation house is situated in the centre of the surgical department, and is connected to the two adjoining pavilions by a closed corridor, these two pavilions being used for the more serious cases before and after the operation, while the other patients are transported to and from the operation house in the open.

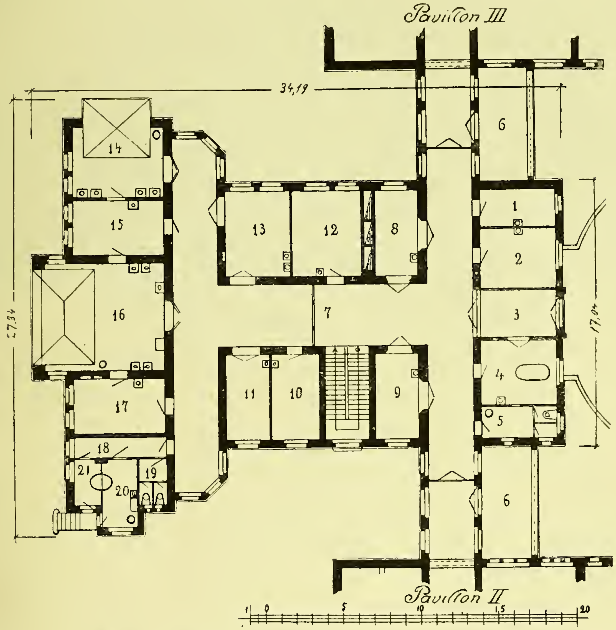

Fig. 40.—Ground Floor Plan of Operation House, Charlottenburg West End.

1, Cystoscopy and Laryngoscopy. 2, Director. 3, Entrance. 4, Accident Bath Room. 5, Cleaner and Staff W.C 8, Women's Waiting Room. 9, Men's Waiting Room. 10, Surgeon. 11, Nurse's Room. 12, Röntgen Room. 13, Anæsthetising Room. 14, Aseptic Operating Theatre. 15, Sterilising Room. 16, General Operating Theatre. 17, Instrument Room. 19, Surgeon's W.C.'s. 20, 21, Sink and Disinfecting Room.

The block contains two completely separate suites of rooms, one for each head surgeon. Those rooms directly relating to operation work are kept to one side of the corridor, so as to be as quiet as possible. The two theatres in each department are of similar form, and it remains with the surgeon which he uses for septic and which for aseptic work. On the first floor of the block are bandage, preparation, etc., rooms, museum, and nurses' and attendants' rooms.

Charlottenburg West End [fig. 40] shows an operation house connected by a closed corridor to the pavilions of the surgical department. To the front of the corridor is the entrance approached by a ramp-up for the ambulance wagons, the bath-room being used for the reception of serious accidents, which are sent direct to the operation house. To the rear of the corridor are the staff-rooms, waiting-rooms, and anæsthetising- and Röntgen-rooms, whilst disconnected from these latter by a through ventilated corridor are the operating rooms. Provision is made here as in the pavilions for the disinfection of the dirty linen before its conveyance to the laundry. On the first floor are the laboratories and the theatre sisters' apartments.

Cologne Lindenburg [fig. 41] shows another type of the operation house, connected to a closed corridor. The operating rooms are disconnected from the remainder by a glazed screen across the central corridor. The large clinical operating theatre, with two anæsthetising rooms adjoining, contains seating for ninety students, who enter by a separate stair. The tiers are constructed of reinforced concrete, and covered with terrazzo, smooth tip-up wood seats with arm desks being provided. The artificial lighting of the table is by a special projecting lamp outside of the theatre with reflecting mirrors, a system often employed in the German clinics. The whole theatre can be darkened and slides projected. A special apparatus for operations in reduced pressure is provided in a separate room. The aseptic theatre is lit by a double-glazed steel bay with an interspace of eight inches. For ventilation the air passes from outside, through radiators, up between the double glazing, and into the room about three feet below the ceiling, the inner glazing stopping at transom height. Extract vents to the roof for the foul air are provided at floor level in the opposite wall. Similar ventilation is provided in the clinical theatre, with in addition vents six feet above the rear row of seating for the inlet of fresh warmed air. Lavatories for the surgeons are provided in separate rooms to the theatres. The floors and dados throughout are tiled. On the first floor are the scientific rooms, the Röntgen Institute, and the staff apartments.

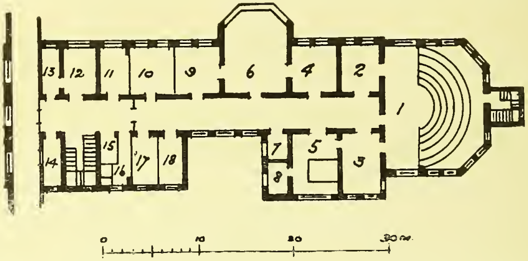

Fig. 41.—Ground Floor Plan of the Operating House, Cologne Lindenburg

1, Clinical Operating Theatre. 2, Anæsthetising Room for Men. 3, Anæsthetising Room for Women. 4, Sterilising Room and Surgeon's Lavatory. 5, 8, Room for operations in reduced pressure. 6, Aseptic Operating Theatre. 7, Bath Room. 9, Anæsthetising Room. 10, Plaster Bandaging Room. 11, Recovery Room. 12, 13, Head Surgeon. 14, Porter. 15, Bed Lift. 16, Water-closets. 17, Patients' Waiting Room. 18, Linen Room.

Other fine operating blocks occur at Hamburg Eppendorf, Nuremberg, Dresden Johannstadt, Munich III., etc., and in the Surgical Clinics at the Royal Charité, Berlin, and at Greifswald very complete clinical operating theatres are found.

(*To be continued.*)

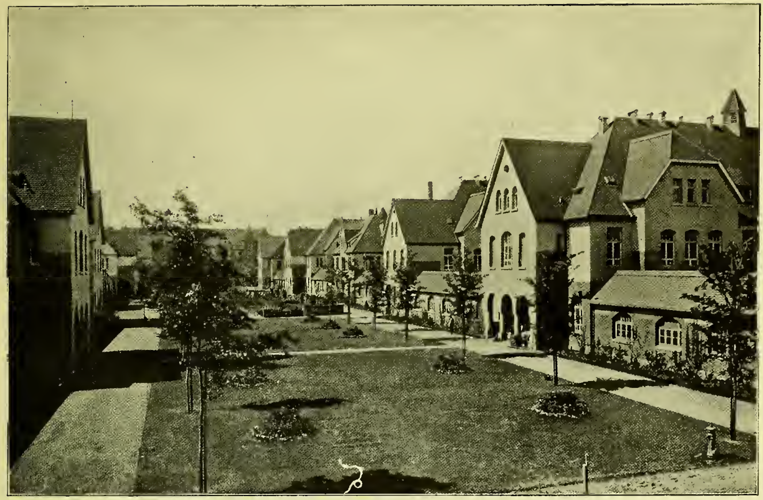

Fig. 62.—Central Gardens, the Lindenburg Hospital, Cologne.

MODERN GERMAN HOSPITAL CONSTRUCTION.—III.

By William Milburn, Junr., B.Sc. [*A.*], Henry Saxon Snell Prizeman 1908, Godwin Bursar 1910.

(*Continued from p.* 108.)

ELECTRICAL AND LIGHT DEPARTMENTS.

THE important parts which the Röntgen Rays, the Finsen Light, and electricity play in the modern treatment of skin and other diseases render the very complete departments found in the German hospitals of great interest. At St. Georg Hamburg and Cologne Lindenburg the light department is placed on the first floor of the operation house. At Hamburg Eppendorf it is a detached block connected to the clinical lecture theatre, at Nuremberg it is connected to the bath house, at the Virchow Berlin it is a detached block in the centre of the hospital, at Düsseldorf it is situated between the pavilions for male and female skin and venereal diseases, and at the Royal Charité, Berlin, it is situated on the upper floors of the out-patients' department for skin and venereal diseases. The accommodation of these institutions usually comprises separate waiting-rooms for men and women, Röntgen rooms for treatment, examination, and photography, Finsen Light treatment rooms, dark-rooms, and laboratories, and the equipment is always very fine and complete.

BATH-HOUSES.

The bathing department is looked upon in Germany as of the greatest importance, and the bath-houses or blocks in which the baths are contained are perhaps without parallel in the English hospitals. Generally speaking, they are situated in the centre of the medical department, between the men's and women's sides, and bear the same relation to that

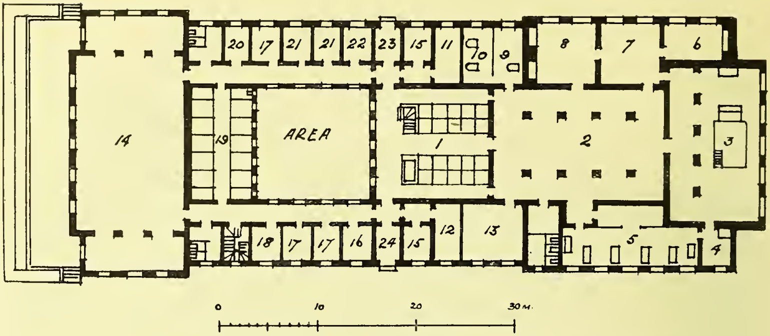

FIG. 42.—GROUND FLOOR PLAN OF THE BATH-HOUSE, THE VIRCHOW HOSPITAL, BERLIN.

1. Undressing Room. 2, Cooling Room. 3. Hydropathic Room. 4, Steam Cabinet Bath. 5, Sand Baths. 6, 7, Turkish Baths. 8, Steam Bath. 9, Electrical Baths. 10, Mineral Water Baths. 11, Electrical Treatment. 12, 13, Inhalatoria. 14, Medical Gymnasium. 15, Bath Linen. 16, Apparatus. 17, Staff. 18, Examination. 19, Staff Baths. 20, Medical Officer. 21, Head Sister. 22, Dining Room. 23, Men's Entrance. 24, Women's Entrance.

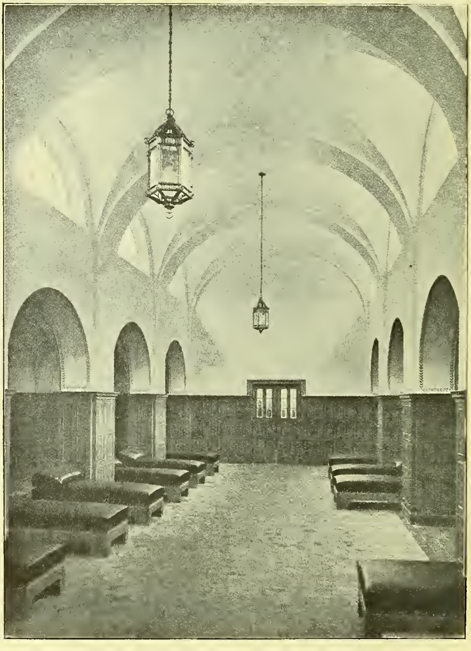

FIG. 43.—CENTRAL COOLING ROOM, THE VIRCHOW HOSPITAL, BERLIN.

department as does the operation house to the surgical department. The baths are not in duplicate for the sexes, but men and women attend at different times. At the Eppendorf and St. Georg Hospitals Hamburg, Nuremberg, Dresden, and the Virchow Berlin, the traffic to and from the bath-house takes place in the open; at Charlottenburg, Cologne Lindenburg, and Munich III., through closed corridors, and at Düsseldorf through a subway.

The finest bath-house in Germany, with the exception, perhaps, of that at Beelitz-i.-Mark, is found at the Virchow Hospital, Berlin [fig. 42], and is a detached block situated in the centre of the medical department, it being as remarkable for its architectural treatment as for its complete equipment. The entrances for men and women are on opposite sides, adjoining the linen rooms, where they receive the bathing linen, and then pass into the undressing room which contains twenty undressing boxes. In this room is a stair and a bed-lift to the sun-bath on the flat roof. The central cooling and massage-room [fig. 43] is entered directly from the undressing room, and is designed on the lines of a basilica, with central vaulted and clerestory-lighted nave and side aisles. Opening from this room are the various bath-rooms for hydropathic treatment, sand baths, carbonic acid gas baths, Turkish and Russian baths, etc. On the side wings are rooms for electrical treatment and inhalation, doctors', nurses', and attendants' rooms, while at the opposite side of the area are staff baths, and facing on to the central avenue the large medical gymnasium, with a terrace to the front for exercises in the open.

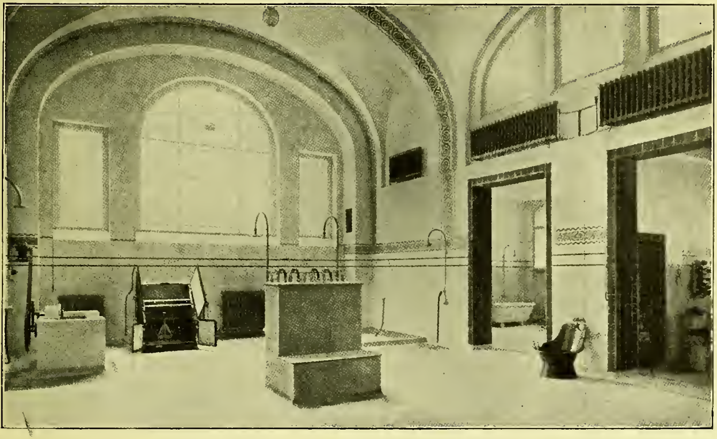

Fig. 44.—The Bath-house, Düsseldorf General Hospital.

As a rule the cooling-rooms are the centre of the bath-house, the various bath-rooms opening from them, as at Düsseldorf [fig. 44] or Charlottenburg. The hydropathic rooms are usually equipped with a variety of sprays, douches, jets, and waves, which are controlled by the attendant from a special platform, various spray and sitz-baths, and usually a cold-water plunge-bath. The carbonic acid gas baths [fig. 45] are mineral-water baths produced by mixing the water and carbonic acid gas under pressure in a cylinder; the hydro-electric baths are either complete, in which the current passes through a plunge-bath, or partial, in

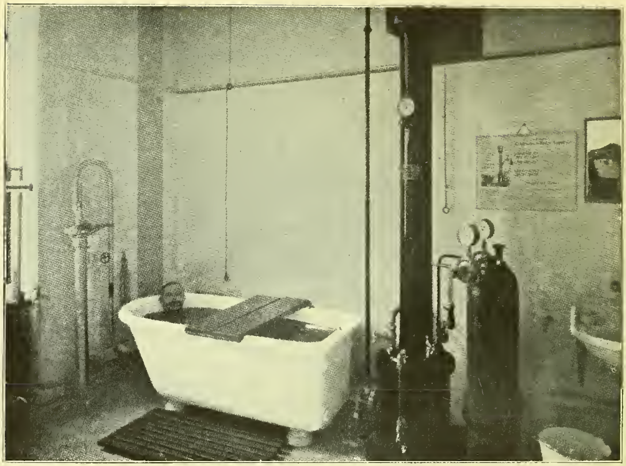

Fig. 45.—Mineral Water Baths, Hamburg St. Georg.

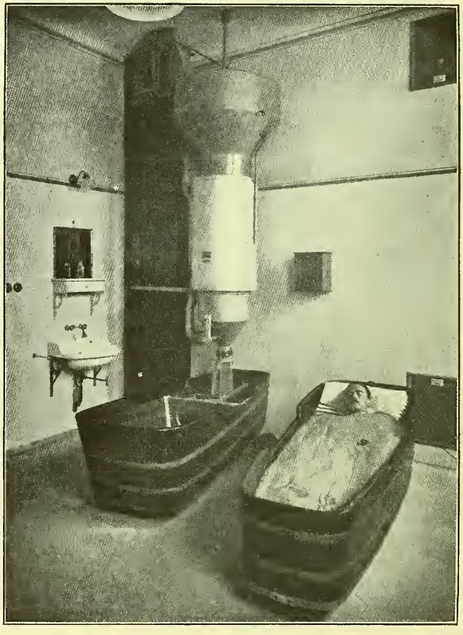

Fig. 46.—Sand Baths, Hamburg St. Georg.

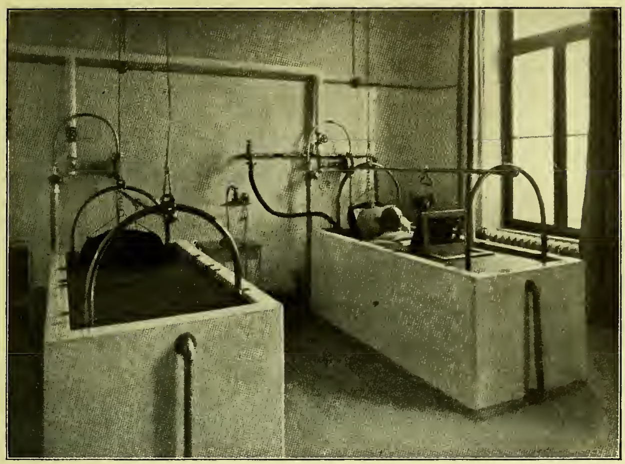

FIG. 47.—PERMANENT BATHS, HAMBURG ST. GEORG.

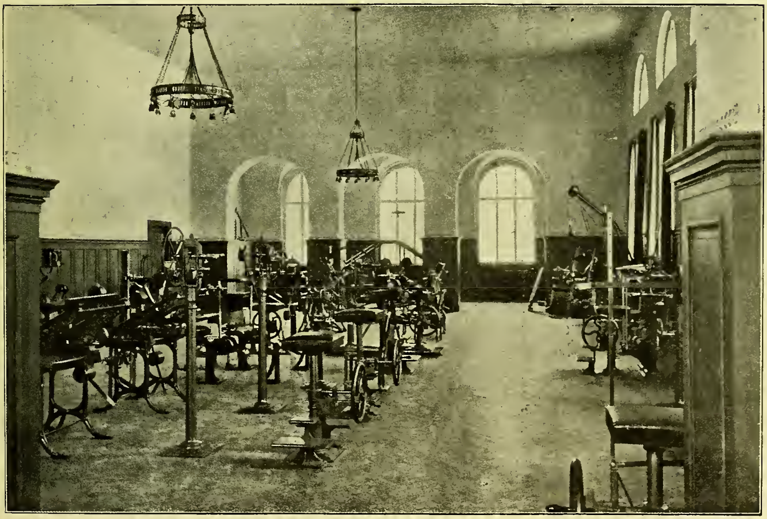

FIG. 48.—MEDICAL GYMNASIUM, THE VIRCHOW HOSPITAL, BERLIN.

which only one or more of the limbs are treated in a small bath. The sand baths [fig. 46] are employed for the application of dry heat, the apparatus comprising a cylinder for heating the sand, wood baths on wheels so as to convey the patient into the open, plunge-baths for use after the bath, and sand stores with apparatus for washing and disinfecting the sand. The Turkish baths comprise the various hot rooms, and are usually *en suite* with the Russian or steam baths. Among the other baths are electric light baths, peat baths, and cabinet baths for steam and hot air. The inhalatoria for chest complaints contain apparatus either for single or for common use.

The water-beds [fig. 47] for permanent baths are of particular interest, every hospital possessing at least one, and they are of great value for such cases as burns and typhoid. They consist of large built baths, in which the patient, who can be wholly immersed, lies on a sail-cloth bearer on a metal frame, which can be lowered or raised, while the flow of water at a constant temperature is automatically regulated. At the Virchow Hospital there is one of these baths in every alternate large ward, in some of the other hospitals, as Munich III., they are contained in single wards, while at Hamburg Eppendorf and St. Georg permanent bath departments with wards for three, two, and one bed are found in the bath-house.

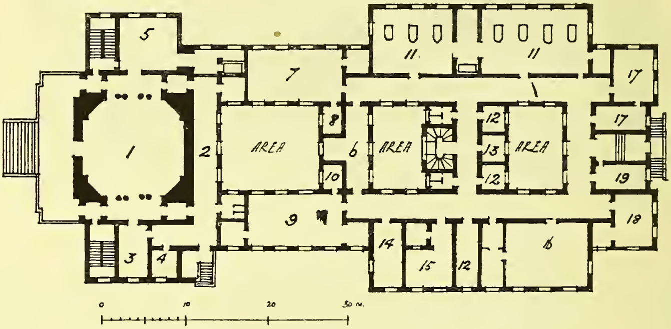

FIG. 49.—GROUND FLOOR PLAN OF THE PATHOLOGIC-ANATOMICAL INSTITUTE, THE VIRCHOW HOSPITAL, BERLIN.

1, Mortuary Chapel. 2, Friends' Waiting Room. 3, Priest. 4, Attendant. 5, Viewing Room. 6, Preparation Room. 7, Histology. 8, Scullery. 9, Bacteriology. 10, Incubators. 11, Dissecting Room. 12, Balance Room. 13, Office. 14, Incubator Room. 15, Photographic Room. 16, Chemical Laboratory. 17, Prosector. 18, Medical Officer's Duty Room. 19, Attendant.

The medical gymnasia [fig. 48] are always most complete, and are employed for what are termed medical or curative gymnastics. They contain a large amount of apparatus, a portion being worked by electric motors, for producing active and passive movements, mechanical massage, and vibration. As a rule, attached to the medical gymnasia, are other rooms for drill or Swedish exercises, the treatment of lateral curvature of the spine, and work-rooms for such work as wood-chopping or sand-shovelling. Fine examples of medical gymnasia are found at the Virchow Berlin, Eppendorf, Beelitz-i.-Mark, and Düsseldorf.

PATHOLOGICAL, ANATOMICAL, AND MORTUARY BLOCKS, AND MEDICAL SCHOOLS.

The very great attention paid in Germany to medical education and the investigation of diseases renders the pathological, anatomical, and mortuary blocks of great importance, every hospital possessing a large block for these purposes, which comprises, in addition to the mortuary and adjoining rooms, dissecting rooms and laboratories for research work, a museum, and, in some cases, class-rooms. Attached to these blocks as a rule are the mortuary chapels and rooms for mourners, in which the funeral services are conducted, and whenever possible this series of rooms has separate access, and is kept distinct from the scientific portion of the building.

One of the finest examples is found at the Virchow Hospital, Berlin [fig. 49], consisting of a large detached block, situated at the head of the central avenue, and with direct access to the adjoining street through an avenue planted with weeping willows. The mortuaries and adjoining rooms are situated in the basement, and the scientific rooms on the ground floor, with the chapel and mourners' rooms to the rear. The mortuary slabs here are of terrazzo, the dissecting tables are of Solenhofer limestone, the floors and dados throughout are tiled, and the fittings to the laboratories are of glass and iron construction. The mortuary chapel [fig. 50], like the majority of these apartments, is particularly fine in its internal treatment. A detached block some little distance from the institute contains the animals for experimental purposes; stalls for the larger animals, cages for the smaller, and a loft for birds, being provided. A special autopsy block is attached to the infectious diseases department for the investigation of infectious diseases, and contains special rooms for work with cholera, plague, and other of the rarer infectious diseases.

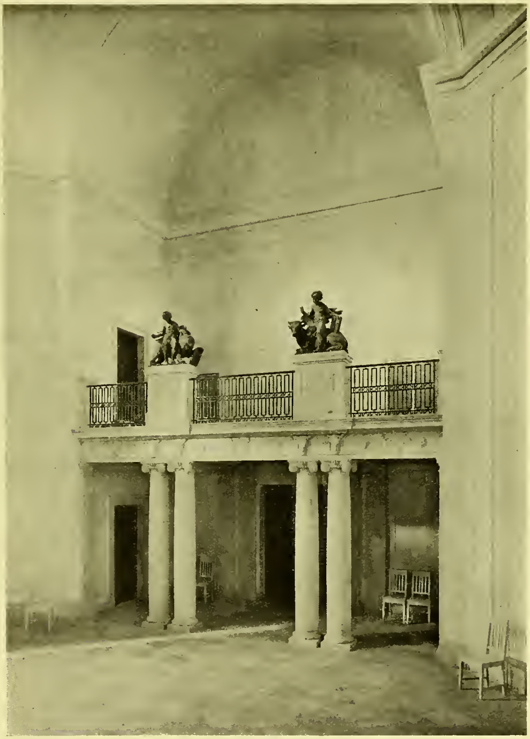

Fig. 50.—Mortuary Chapel, the Virchow Hospital, Berlin.

Other fine examples of these blocks are found at Hamburg Eppendorf and St. Georg, Nuremberg, Dresden, Schöneberg, and Charlottenburg West End.

At the Frankfort City Hospital there is a very fine Anatomical Institute, founded by the Senckenberg bequests, with lecture theatres and adjoining rooms, and in the two Academies of Medicine at Düsseldorf and Cologne respectively one finds very complete pathological institutes fully equipped with laboratories and lecture theatres, for post-graduate courses and research work. A portion of the block at Düsseldorf forms the finely equipped Institute of Experimental Therapy, while at Cologne Lindenburg a point of interest is that the mortuary chapel and mourners' rooms are in an entirely separate block well away from the pathological institute, communication between the two being by a subway, as is the mortuary traffic throughout the hospital. At Dresden Johannstadt, too, the mortuary traffic takes place in subways, the bed-lifts descending to the basement for this purpose.

In the Royal Charité Hospital attached to the University of Berlin the pathological institute is said to be the finest in the world, the autopsies per year numbering over two thousand. It consists of three large blocks connected together by closed corridors. The main block is of three stories, and contains the scientific rooms, laboratories, and research rooms; the autopsy block is again of three stories, and contains the mortuaries, etc., in the basement, with the chapel and mourners' rooms adjoining, and the dissecting rooms and clinical lecture theatres on the upper floors; while the third block of five stories is the museum, and contains the unique collection of specimens accumulated by the celebrated pathologist, Rudolf Virchow. A detached animal stable for the experimental animals completes the institute.

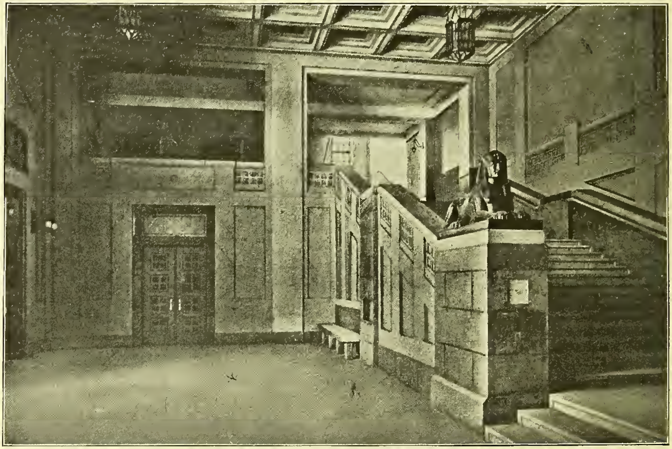

FIG. 51.—ENTRANCE HALL, THE ROYAL ANATOMICAL INSTITUTE, MUNICH.

The new Anatomical Institute at Munich [fig. 51] which forms part of the University is a detached block situated in the clinical quarter of the city, and is largely of reinforced concrete construction. On the ground floor is the fine entrance hall with staircase, the public museum of anatomical specimens etc., on the first floor the large dissecting hall, semi-circular in shape, in which five hundred students can work at the same time, the large lecture theatre with accommodation for about three hundred, and adjoining rooms, and on the upper floors the microscopical and research rooms, and laboratories.

RESIDENTIAL BLOCKS.

The directors as a rule have special houses provided for them in the hospitals, as at the Virchow Berlin, Nuremberg, and Munich III., while the resident officials either have special houses or else apartments in the administrative block.

Some of the doctors usually reside in their pavilion, generally on an upper floor, while the remainder have their apartments in the administrative block, or in a doctors' home as at the Virchow.

The quarters for nurses differ in the various hospitals. As a rule a proportion of the nurses sleep in their pavilion, in the older type, as Hamburg Eppendorf and Nuremberg, on the same floor as the patients, and in the more recent, as the Virchow or Charlottenburg West End, on an upper floor. The nurses' home itself is often contained on the upper floors of the housekeeping block, as at Nuremberg, Dresden, or Düsseldorf, but detached homes are as often found, as at the Virchow, Cologne, Charlottenburg, or Munich III.

The domestic staff have their apartments as a rule close to their work, the kitchen staff in the kitchen block, laundry maids in the laundry block, ward maids in the pavilions, and female staff generally on the upper floors of the nurses' home or administrative blocks.

The technical staff, as engineers and electricians, reside close to their work, and lodges are provided for the porters.

DOMESTIC BLOCKS.

The domestic or economic blocks comprise the kitchens, laundries, and stores, and are kept entirely separate and detached from the administrative offices and the patients' quarters, yet at the same time as central as possible for service. They are usually grouped with the technical blocks with separate access for tradesmen, good examples of this grouping being found at Hamburg Eppendorf and the Virchow Hospital, Berlin.

As a rule the food service from the kitchens to the pavilions takes place through the open in special dinner-wagons. At Dresden in wet weather the service is performed in the subways, while at Munich III., perhaps the most modern hospital, the kitchen block is connected up to the pavilions by closed corridors. The food wagons generally serve directly to the doors of the pavilions, and thence to the ward kitchens, but at Schöneberg the food is passed through a special opening below the sill of the ward kitchen window, and at Düsseldorf and Cologne the food is brought to an outside lift by which it is raised to the ward kitchens. In infectious diseases pavilions the service generally takes place through a special window.

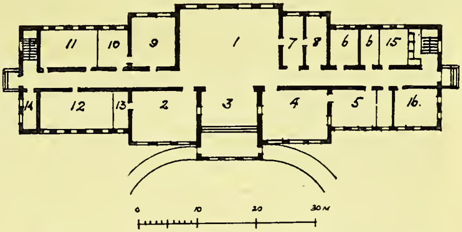

Fig. 52.—Ground Floor Plan of the Kitchen Block, the Virchow Hospital, Berlin.

1, Central Kitchen. 2, Roasting Kitchen. 3, Servery. 4, Scullery. 5, Crockery. 6, Pantry. 7, Housekeeper. 8, Milk Room. 9, Meat Preparing. 10, Meat Store. 11, Groceries. 12, Vegetable Scullery. 13, Roasting Utensils. 14, Steward. 15, Office. 16, Staff Dining Room.

A common arrangement is to place the kitchen and laundry in one block as at Nuremberg, Düsseldorf, or Dresden Maternity, known as the "Wirtschafts-Gebäude" (housekeeping block), the kitchen being in one wing and the laundry in the other, while the nurses' and servants' homes and hospital stores are on the upper floors. In other hospitals, as at Charlottenburg West End, Munich III., Schöneberg, or the Virchow Berlin, the kitchens and laundries are in separate blocks.

The Virchow Hospital kitchen block [fig. 52] is perhaps a typical example of the

German hospital kitchen. The main kitchen [fig. 53], placed in the centre of the ground floor, is 58 feet long by 44 feet wide, and rises through the two stories. All boiling is done by steam and roasting by gas, the equipment comprising 24 boiling-pans of various sizes with a total capacity of 2178 gallons, boiling and roasting hearths, etc. To the front of the kitchen is the servery to the food-wagon porch, and on either side the roasting and boiling kitchen, with 26 gas ovens, potato-steamers and grids, and the scullery, each of which is 36 feet long by 29 feet 6 in. wide and has rooms adjoining for roasting utensils and crockery respectively.

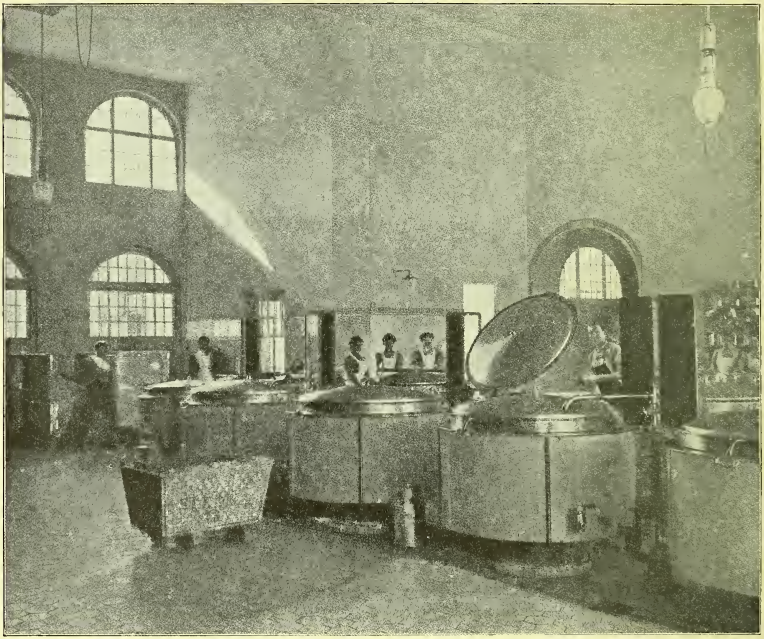

FIG. 53.—THE CENTRAL KITCHEN, THE VIRCHOW HOSPITAL, BERLIN.

The other rooms on the ground floor comprise the housekeepers' room, milk room and pantries, meat preparing room and pantries, large provision store, stewards' room, office, and staff dining-room.

In the basement are store rooms with refrigerating apparatus for vegetables, potatoes, meat, beer and wine, mineral water manufactory, and dining and bath-rooms for the male staff. On the first floor are the apartments for the head-cook, cook, and 36 kitchen-maids, and on the roof floor the apartments for 17 male kitchen staff. A detached block to one side contains the wagons for the food service. The floors generally are tiled and the dados glazed tiled, while special provision is made for exhausting steam.

The laundry block [fig. 54] at the Virchow Hospital is of similar form to the kitchen block and is a typical example of the German hospital laundry. The sterilised linen from the pavilions is brought to the covered porch at the eastern end of the block, and then taken into the receiving room, where it is sorted into the bins, which are constructed of reinforced concrete covered with white glazed tiles. Adjoining is the steeping room, containing 27 steeping troughs of similar construction to the sorting bins, three steam boiling-pans for the removal of any blood or pus spots from the linen, and boilers for the soap and soda solution, which is led from here to the washing machines.

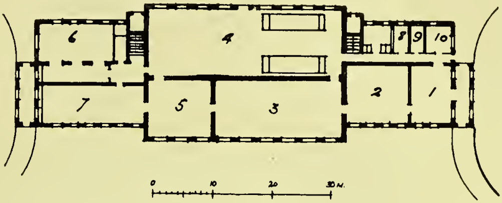

Fig. 54.—Ground Floor Plan of the Laundry Block, the Virchow Hospital, Berlin.

1, Receiving Room. 2, Steeping Room. 3, Wash House. 4, Drying Room. 5, Mangling Room. 6, Ironing. 7, Delivery Room. 8, Engineer. 9, Soap Store. 10, Office.

The linen then enters the wash-house, 70 feet 6 in. long by 31 feet wide and extending through the two stories. The machinery, which does not differ greatly from that employed in England, is all electrically driven, and comprises ten washing machines, each capable of washing eleven stones of dry linen in 45 minutes, and six hydro-extractors making 800 revolutions per minute [see fig. 55].

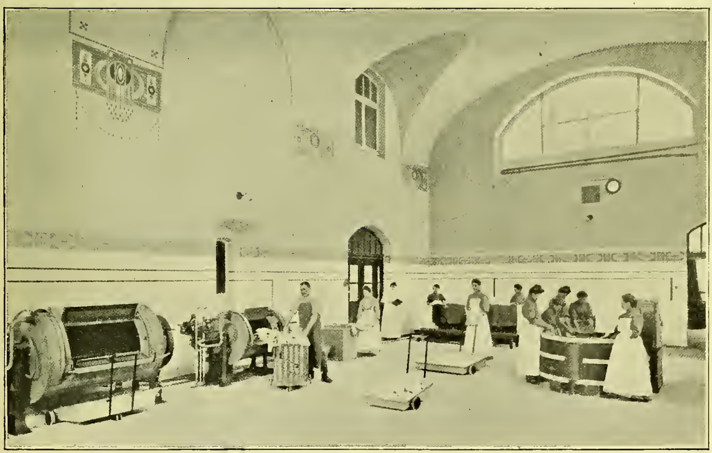

Fig. 55.—The Wash House, Düsseldorf General Hospital.

The smooth bed and table linen passes next to the mangling room, where it is dried and ironed at the same time by two steam mangles.

The coloured, wool, and body linen comes into the drying room, to the "chain" drying apparatus, which is very largely employed in Germany, drying houses or drying compartments being uncommon. It consists of a closed wooden compartment some 30 feet long and 10 feet wide, which is steam heated, the hot air passing out through an extract duct at the top. The linen is hung at the entrance end of the apparatus on horizontal rods, which travel on a continuous chain in about an hour to the opposite end of the compartment, where the linen falls into a box, while the rods return on the lower segment of the moving chain to the entrance end. The linen is then mangled by three electrically driven machines, and folded on the special tables, whence it is taken to the ironing room which contains fifteen working places, or to the delivery room, which adjoins the porch to which the linen-wagons come to convey the clean linen to the pavilions.

The remaining ground floor rooms comprise an office, soap store, engineers' room, and a large dressing-room and lavatory for the laundry staff. On the first floor is a large needle room with twelve sewing machines, a reserve ironing-room, a dining-room with scullery for the laundry maids, large linen stores, and apartments for the head-laundress and nine laundry maids, whilst on the roof floor accommodation is provided for 24 more maids. A large turf stretch to the north of the block is used as a bleaching ground for the linen, and a small block to the east contains the linen-wagons.

Special blocks are in some cases erected for the hospital and general stores, as the "economy" block at Hamburg Eppendorf, while at others they are contained on the upper floors of the kitchen and laundry blocks. Detached ice houses for ice storage are found at Hamburg Eppendorf and Dresden.

TECHNICAL BLOCKS.

The technical blocks, comprising the boiler- and engine-houses for the provision of the heating, water supply, lighting, and power for the hospital, the workshops, and the disinfection blocks, are usually grouped together in a convenient and central position, with separate access from outside.

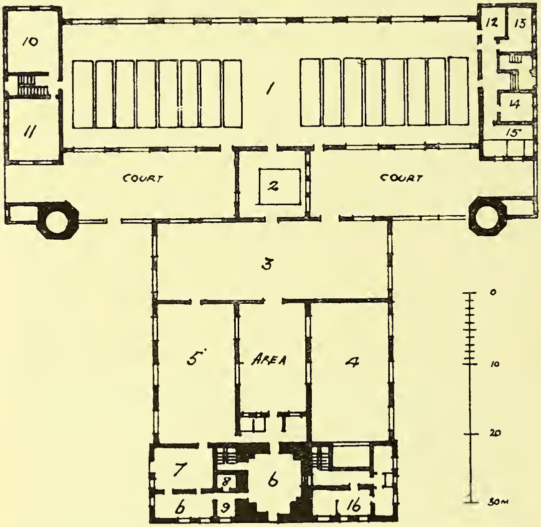

Fig. 56.—Ground Floor Plan of the Boiler and Engine House Block, the Virchow Hospital, Berlin.

1, Boiler House. 2, Pump Room. 3, Engine Room. 4, Accumulators. 5, Water Supply. 6, Water Tower. 7, Ice Machine. 8, Ice Store. 9, Ice Delivery. 10, Engineer's Workshop. 11, Smith and Plumber. 12, 13, Engineers. 14, Staff Dining Room. 15, Bath and Lavatory. 16, Electrical Engineer's Apartments.

The boiler- and engine-house block [fig. 56] at the Virchow Hospital, Berlin, may be taken as a typical example. The boiler-house [fig. 57] is 197 feet long by 59 feet wide, and contains

16 boilers of the Lancashire type with superheaters, eleven of which with a pressure of eight atmospheres are for the heating and hot-water supply of the whole hospital, the cooking, disinfecting, and sterilising apparatus, and five with a pressure of eleven atmospheres are for the electric lighting supply, the pumps for the water supply, and the ice machine.

The pump-room contains the steam distribution valves, the pumps, and the condense water-tanks under. The engine-house is 110 feet long by 36 feet wide and contains three dynamos for the electric lighting supply and power. The water supply room contains the apparatus for the cold and hot water supply of the whole hospital. The adjoining rooms contain the ice machine, which is capable of providing 43 cwts. of ice in 24 hours by the sulphuric-acid compression process. The remaining rooms comprise staff apartments and offices, engineers' and electricians' workshops, etc.

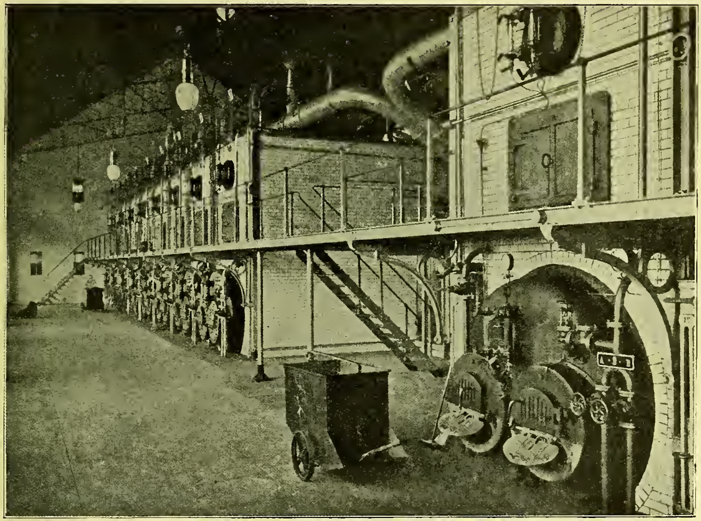

Fig. 57.—The Boiler House, the Virchow Hospital, Berlin.

The workshops block at the Virchow is situated close to the boiler-house, and contains large workshops for the upholsterer, joiner, painter, and glazier, and offices, and on the upper floors large hospital stores.

The disinfection blocks are always very large and complete, owing to the fact that the hospitals usually contain an infectious diseases department, and also that the blocks are often used for the disinfection of the bedding and articles brought from houses in the cities where infectious disease has occurred.

The block at Charlottenburg West End [fig. 58] is a good example of the type. The apparatus employed does not differ greatly from that in use in England. Superheated steam is employed for disinfecting clothing, bedding, and mattresses, boiling for smaller articles, and formalin chambers for leather, fur, and felt articles. The disinfectors [fig. 59] are built into a wall forming infected and disinfected sides, access from one side to the other being only through a bath-room with dressing- and undressing-rooms adjoining. The patients' clothes are stored in bags hung on special hooks in a large clothes store in the roof. Two destructors are provided for bandages, refuse, etc., and a disinfecting and cleansing apparatus for the vessels in which the infected bandages are brought from the infectious diseases department. A small discharge department for patients on discharge from the infectious diseases department is also provided, comprising undressing, bath, and dressing rooms.

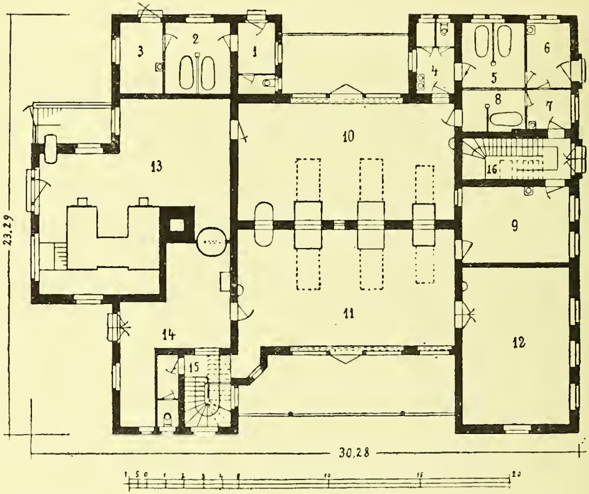

Fig. 58.—Ground Floor Plan of the Disinfection Block, Charlottenburg West End Hospital.

1, 2, 3, Undressing, Bath, and Dressing Rooms for patients on discharge from the Infectious Diseases Department. 4, 5, 6, Disinfection Attendants' Undressing, Bath, and Dressing Rooms. 7, 8, Officials' Undressing, Bath, and Dressing Rooms. 9, Disinfection Overseer. 10, Infected Side. 11, Disinfected Side. 12, Mattresses etc. Store. 13, Destructor Department. 14, Delivery Room for Bandage Receptacles. 15, Staircase to Patients' Clothes Store. 16, Staircase to Disinfection Attendants' Apartments.

In those hospitals, such as Dresden Johannstadt, which are the centres for the municipal ambulance service, complete stables and coach-houses with drivers' apartments are provided.

GROUNDS.

The German hospitals are always remarkable for the lay-out of their grounds, the Virchow Hospital, Berlin, being a fine example. Here a large portion of the site is laid out as a park [fig. 60] for convalescents, and provided with garden pavilions and summer-houses, while the fine central avenue [fig. 61] with its four rows of large trees and gardens, and the architectural courtyard, have already been described. Other fine examples are Cologne Lindenburg [fig. 62], and Charlottenburg West End, where the central spaces between the medical and surgical departments are very well laid out. In the majority of the hospitals large green-houses are provided, and also in many cases vegetable gardens.

HEATING.

The heating system adopted in the German hospitals is almost invariably derived from a central source—the boiler-house—the steam being conveyed from the boilers in the main through subways to the separate blocks, usually at a pressure of about eight atmospheres. At Hamburg Eppendorf a separate heating installation was originally provided to each pavilion, but the disadvantage of the constant coal traffic through the grounds, and the smoke production from the various chimneys, led in recent years to the grouping of three or more pavilions together for heating purposes, while in the pavilions of the new infectious diseases department recently erected the heating is derived from a new central boiler-house.

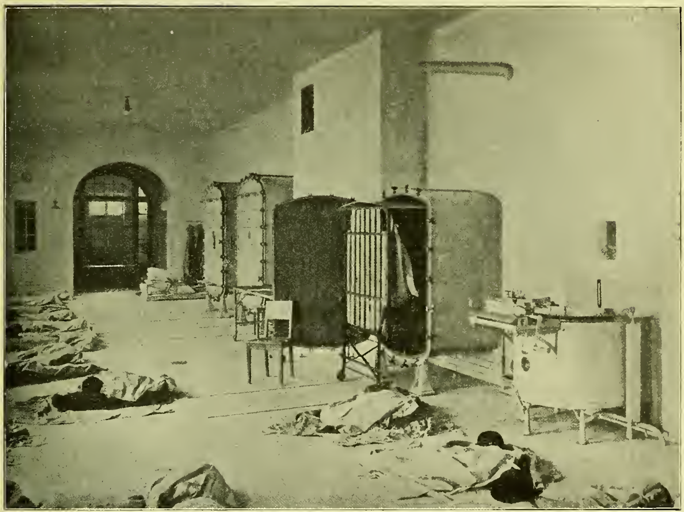

Fig. 59.—Disinfecting Apparatus, the Virchow Hospital, Berlin.

The heating medium generally employed is radiation, the usual methods being either by low pressure hot water or atmospheric pressure steam. If the former, each block is usually treated separately from heating calorifiers placed in the basement. The radiators are almost invariably open, and are of the vertical loop type, bracketed clear of the walls; or a form much employed is some half-dozen horizontal pipes about two inches in diameter, placed one above the other, and running round the window walls to sill height. If the heating is by steam it is reduced on entry into each block to the required pressure, usually about 1/10 atmosphere, though it varies in the different hospitals. The radiators for steam heating are of the vertical loop type.

Speaking generally, administrative, domestic, and technical blocks are heated by steam, pavilions and blocks for patients by hot water, but this rule is subject to much variation. Operation houses, where a high temperature may be required at short notice, or bath and similar rooms, which may occasionally require to be heated in summer, are as a rule heated by steam. The special methods adopted for the heating of operating theatres have already been described.

At the Johannstadt Hospital, Dresden, the heating is by hot air, the heating and ventilation being combined.

At the Eppendorf Hospital, Hamburg, the original method of heating the wards was by warming the terrazzo floors by steam pipes suspended in channels beneath the floors, after the manner of the Roman thermæ. It was claimed for this method of heating that while the feet were kept warm the head was kept cool, the heat was diffused equally, and a thorough circulation of the air was ensured, but in practice it has been found that the floors are most liable to crack, they in many cases having to be relaid every five years, while the nursing staff by continually working on the heated floors are rendered liable to various ailments. In the new infectious diseases department at this hospital the heating is by steam radiators.

In many cases, however, steam pipes are suspended beneath a ground floor with the intention of warming the floor to a similar extent as the first floor is warmed by the heated rooms under, and so to take the chill from the tiles or terrazzo floor.

All windows are usually double-glazed so as to prevent loss of heat by radiation.

The usual temperature specified for the wards and patients' rooms is about 68° Fahr., for staff and sanitary rooms about 64° Fahr., for operating theatres about 86° Fahr., and for rooms in the administrative and domestic blocks about 68° Fahr.

Open fires as a heating medium are practically unknown, the one source of smoke in the hospital being the boiler-house stack, where the smoke production can be scientifically controlled.

VENTILATION.

The prevailing opinion in the German hospitals appears to be that natural ventilation is preferable to artificial methods. Some form of ventilating apparatus is, however, almost invariably installed for use in winter, as during the cold weather it is often impossible to open the windows of the wards, and on rare occasions in summer ventilating apparatus may be required.

The windows are almost invariably casements opening in with fall-in fanlights over. It is claimed for this type of window, as against the English sash window, that it is less complicated in construction, that the whole area of the window can be opened, as against only half with sliding sashes, and that the casements protect the beds on either side from draughts.

It is not usual to have direct inlets for fresh air from outside to the wards, but extract vents with ducts to the roof are usually provided at ceiling level for use in summer.

For use in winter the simplest form of ventilation is by aspiration, as, for example, that found at Hamburg St. Georg. Here inlet vents are provided at each end of the ward about seven feet above the floor level, through which the fresh air warmed by steam-pipes in the basement enters. Extract ducts to the roof for the foul air are provided at each end of the ward, with vents at floor level.

This form of ventilation is found in many hospitals, with variations in detail, such as the addition of screens for filtering the air, water-troughs for humidifying the air, or the placing of aspirating coils in the extract ducts to increase the ventilation. Mechanical means are often employed, usually by propulsion, occasionally by extraction, by propulsion and extraction combined, or by propulsion and aspiration, each block as a rule being separately treated, it not being usual in the German hospitals to employ a central system.

At Charlottenburg West End the air is led from special intakes through a filter, over a heating battery with humidifying vessel, and into a mixing chamber, where the requisite temperature is attained, after which it is driven by a fan through ducts into the upper portions

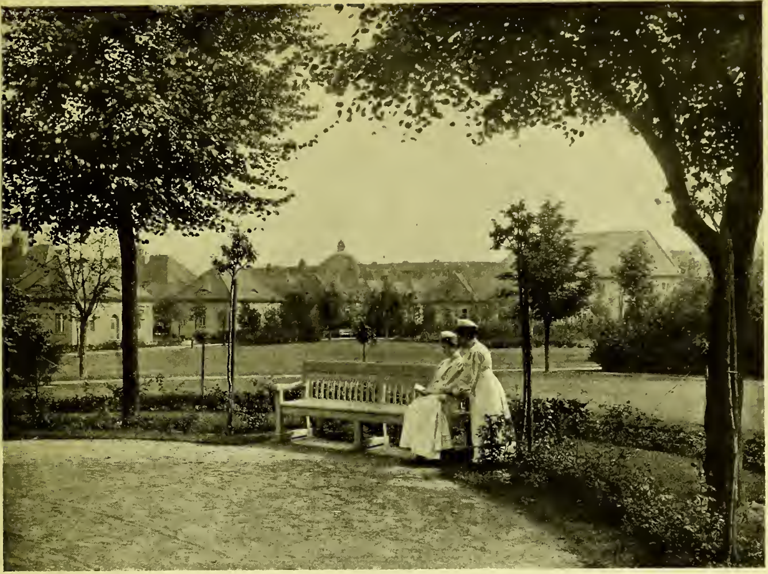

FIG. 60.—VIEW IN THE PARK, THE VIRCHOW HOSPITAL, BERLIN.

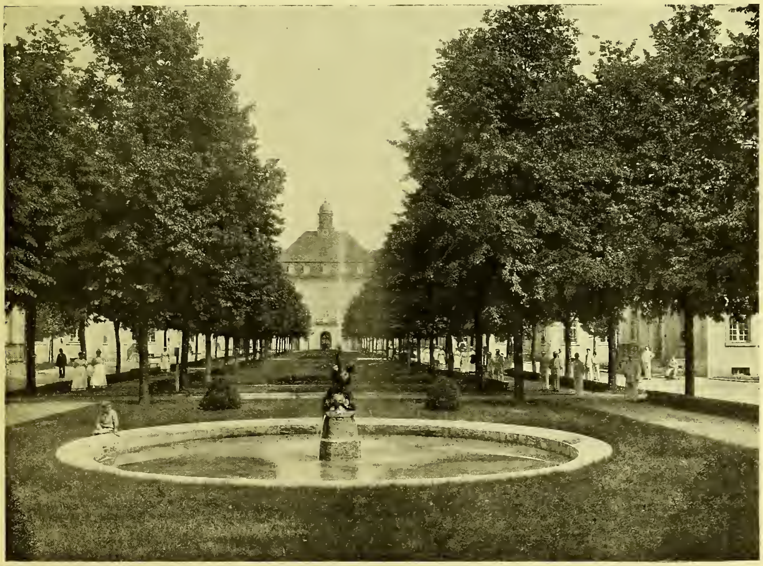

FIG. 61.—THE CENTRAL AVENUE, THE VIRCHOW HOSPITAL, BERLIN.

of the rooms. Extract vents for the foul air are provided at floor level to ventilating turrets on the roof, in which aspirating coils are fixed.

At Schöneberg propulsion is combined with aspiration, the fresh air being drawn by an electric fan through a heating battery, in which it is warmed to a temperature of 60° Fahr., into a very large warm air chamber, which extends for nearly the whole length of the pavilion. From this chamber vertical ducts ascend to the various rooms, a radiator at the foot of each duct raising the ascending air to the required room temperature. The inlet vents are just below the ceiling level, and extract vents at floor level, each with a separate duct, lead the foul air above the roof and into the open.

At the Virchow Hospital, Berlin, propulsion is combined with extraction, there being an electric fan in the basement and one in the roof of each pavilion, it being possible to produce a complete change of air five times per hour in all wards, rooms, and corridors. The fresh air passes over a dust-precipitating chamber, through a cotton-wool filter, and then over a heating battery, after which, mixed with the requisite proportion of cool air, it passes through the ducts into the upper portions of the rooms. The extract vents are placed in the lower portion of the rooms, and the foul air is extracted through ducts to the electric fan chamber in the roof, and driven out through the ridge turrets into the open. In the large wards of the one-story pavilions the fresh warmed air enters at each end, through two vents, each about 2 feet 6 in. by 1 foot 6 in., placed above each of the doors, at a height of 11 feet 6 in. above the floor. The foul air leaves through four vents about 9 in. by 8 in. on each long side between alternate windows and placed 1 foot 6 in. above the floor. In the other rooms of the pavilion the ventilating arrangements are similar to those of the large wards, except in the sink and water-closet rooms, where extract vents only at ceiling level are provided, the ducts from these being kept entirely separate from those of the other rooms until just before the fan chamber.

At Munich III. special dust-depositing chambers and washing filters are employed, while the ducts are oval or circular in section, and can be flushed out.

At the Johannstadt Hospital, Dresden, in which the apparatus is capable of producing a change of air of five times per hour in the wards, the heating and ventilation are combined, being by hot air. The fresh air passes through a heating battery in which it is warmed to a temperature of 59° Fahr., and is then driven by a fan into the large warm-air chamber which extends for the whole length of the pavilion, and serves at the same time to precipitate the dust and to warm the floor above. From this chamber vertical ducts ascend, at the foot of each radiators being placed to warm the air to the necessary temperature for heating the rooms. The ducts, two of which are placed in the centre of the floor of each large ward, are constructed of sheet-iron about three feet long, two feet wide, and six feet high, the top being covered with a grating. The extract vents for the foul air are at floor level, and lead in ducts to extract turrets on the roof.

In such hospitals as Schöneberg or Dresden, where ample room and light are provided, and the ventilating installation can be easily inspected and cleaned, the cleanliness of the system appears to be all that can be desired. In some of the hospitals, however, in which the ventilating rooms are cramped, the lighting deficient, or in which the main ventilating ducts also contain the heating and other pipes, the cleanliness often leaves much to be desired; indeed in the recent extensions to the Frankfort City Hospital no form of mechanical ventilation is being installed, as it has been found that in the older pavilions the ventilating apparatus has got into such a bad state.

The usual amount of fresh air specified for the large wards is 2650 cubic feet per bed with a change of twice per hour, for day-rooms, bath-rooms, and ward kitchens a change of twice, and for sanitary rooms a change of five times per hour.

LIGHTING.

The lighting of the hospitals is almost invariably by electricity, derived either from the municipal supply or from generating plant in the hospital, as at the Virchow Berlin. Whenever possible two supplies are obtained and alternate lights wired from the separate supplies. The fittings are of great variety, some excellent types being found at St. Georg Hamburg. Arc lights are largely employed in the grounds, in the domestic and technical blocks, and for operating theatre work. Gas is also installed in some hospitals in case of breakdown, and is of course largely employed for cooking, sterilising, etc.

COLD WATER SUPPLY.

The water supplies of the hospitals are usually derived from the municipal mains, though at Eppendorf Hamburg and the Virchow Berlin the supply is derived from the institutions' own plant. At the latter three artesian wells have been sunk, from which 10,600 cubic feet of water are raised per hour. Special plant is provided for precipitating the iron which the water here contains, and for filtration. The reservoir is of 8800 cubic feet capacity and is situated on the water tower 158 feet high, the pressure in the supply pipes being three atmospheres.

HOT WATER SUPPLY.

The usual system of hot water supply is to place hot water supply calorifiers in the basement of each block, and to lead steam to them from the central boiler-house, each block being treated separately. At St. Georg Hamburg central hot water supply tanks are provided at the top of the administrative block. At Dresden Johannstadt and the Virchow Berlin the hot water supply is central, at the latter there being three calorifiers in the engine-house block, in which the water is heated by the exhaust steam from the engines to a temperature of from 70° C. to 80° C., and then circulated through the mains under the pressure of the supply from the water tower, thus giving at all mixing valves, etc., hot and cold water at the same pressure.

SANITARY APPARATUS.

Lavatory basins are usually of porcelain, many different types being found. For operating theatre work the supplies are usually combined, giving a jet or spray with elbow action levers, and knee action wastes, pedal action fittings seldom being found.

Baths again are of various patterns, movable or fixed; porcelain, enamelled iron, and copper are found, but the latest and favourite material is nickel-plated steel, which is much employed.

In some hospitals the supply pipes to baths and lavatories stand clear from the walls, but in others, as the Virchow Berlin, they are placed in chases in the brickwork behind the tiled dados, which gives a very smooth finish but is somewhat awkward to deal with when repairs are necessary. With regard to traps, in addition to S and P traps some interesting forms of improved " bell " and " dip " traps are found.

Water-closets are usually of the wash-down type, though closets of the wash-out pattern are often found. The flush is usually from a cistern with pull, although at the Virchow pneumatic supply valves are employed.

The slop-sinks are of various types, those of English porcelain and manufacture being often employed.

The slop-sink disinfectors, as employed at the Virchow Berlin or Charlottenburg [fig. 63], for the disinfection of urine, fæces, and sputum, before discharge into the drains, are of considerable interest. They consist of a cylindrical copper vessel, tinned inside, and having a false bottom, with a sharp fall to the outlet to the drain. To disinfect the contents, the lid and the outlet to the drain are closed, and steam is turned into the false bottom, the disinfection at a temperature of 110° C. being complete after about 15 or 20 minutes. The steam and gases from the boiling contents are led by a water condenser from the upper portion of the vessel into the drainage outlet below the trap. A ring spray is provided in the interior of the cylinder for the cleansing of the bed pans and other vessels, which can when occasion requires be disinfected in this apparatus.

In the majority of the hospitals well ventilated closets are provided for the retention of fæces etc. for examination by the doctor.

Wash-up sinks are often of porcelain, though the favourite material is perhaps durana metal, which is very largely employed.

DRAINAGE.

Although in some of the German hospitals the details of the drainage would not meet with approval from the English point of view, yet in others it is well up to the English standard, and as a rule the provision for disinfection is always greater.

The drainage system follows in general the English type, the great difference perhaps being that, owing to the climate, all soil, waste, and vent pipes are kept inside the buildings, the drains in the basements, often of cast iron, being suspended from the ceilings. Separate sewage and rain-water systems are often provided.

Many of the municipalities require that before discharge into the public sewers all drainage from the patients' and mortuary buildings must be disinfected. At Hamburg Eppendorf and St. Georg [fig. 64] central installations for this purpose are provided, by which all the drainage is collected in large tanks and treated with lime. At Nuremberg a central system is again installed, the disinfection here being by the Müller-Nansen process. At Dresden Johannstadt a separate installation is provided for every two blocks, the disinfection being by lime. At Charlottenburg West End each ward floor contains a slop-sink disinfector, as already described, in which all fæces, etc., can be disinfected before discharge. This type of apparatus is much employed in pavilions for infectious diseases, as at the Virchow Berlin and Düsseldorf. The drainage from mortuary blocks is usually collected in tanks and disinfected by lime.

TELEPHONE SYSTEMS, ETC.

As a rule all hospitals have a very complete system of inter-departmental telephones; at the Virchow, for example, there are 95 speaking points, of which 20 can be used for external communication, the installation being controlled from a central exchange in the administrative block.

Alarm bells from the wards to the nurses' rooms are also invariably installed, and electric clock systems for recording the alertness of the night attendants are found, particularly in the insane blocks.

Vacuum cleaning apparatus is often installed throughout, as at the Virchow Berlin and Munich III.

COST OF LAND, BUILDINGS, AND EQUIPMENT.

The cost of the various hospitals of course varies greatly according as their locality, construction, or equipment varies. For example at Nuremberg the cost of the site was £6250, the cost per bed of the buildings £175, and of the equipment £39, or a total cost per bed for buildings and equipment of £215, while at the Johannstadt Hospital, Dresden, the cost of the site was £84,000, and the cost per bed for buildings and equipment was £357. In the well equipped and recently erected infectious diseases department at Hamburg Eppendorf for 200 beds, the cost per bed for the buildings has been £483, for the equipment £91, or for

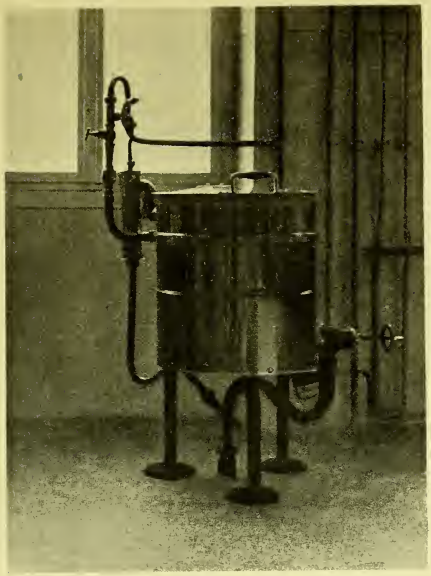

Fig. 63.—Slop Sink Disinfector, Charlottenburg West End Hospital.

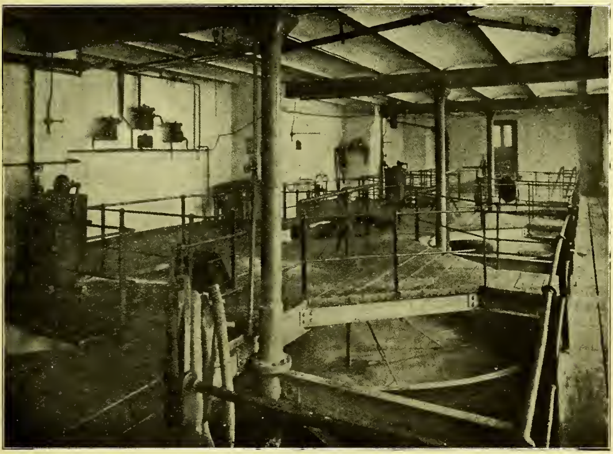

Fig. 64.—Drainage Disinfection Installation, Hamburg St. Georg Hospital.

the buildings and equipment together £575, while at the Rudolf Virchow Hospital, Berlin, the cost per bed for the buildings has been £408, for the equipment £68, or for buildings and equipment together £477.

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